DEFENSE INDUSTRY BULLETIN

D1.3/2:3/7

VOL. 3 NO. 7

AUGUST 1967

UNIVERSITY OF FLORIDA LIBRARIES
JUL 1967
DOCUMENTS DEPT.

UNIV. OF FLORIDA LIBS.
DOCUMENTS
DEPARTMENT
U.S. DEPOSITORY

IN THIS ISSUE

FEATURES

Solving Packaging Problems Through Research and Development
Dr. Edward A. Nebesky
Dr. Martin S. Peterson 1

Naval Ordnance and Industry 4

Department of Defense Selected Economic Indicators 21

Progress in SAIMS Subsystem Development
Colonel Herbert Waldman, USAF 12

Report on Paris Air Show 1967 24

DEPARTMENTS

From the Speakers Rostrum 9

About People 15

Meetings and Symposia 17

Bibliography 20

Defense Procurement 29

The *Defense Industry Bulletin* is published monthly by the Business & Labor Division, Directorate for Community Relations, Office of the Assistant Secretary of Defense (Public Affairs). Use of funds for printing this publication was approved by the Director of the Bureau of the Budget.

The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

Contents of the magazine may be reprinted freely without requesting permission. Mention of the source will be appreciated.

DEFENSE INDUSTRY
BULLETIN

Published by the
Department of
Defense

Hon. Robert S. McNamara
Secretary of Defense

Hon. Paul H. Nitze
Deputy Secretary of Defense

Hon. Phil G. Goulding
Assistant Secretary of Defense
(Public Affairs)

Col. Joel B. Stephens, USA
Director for Community Relations

Col. J. S. Douglas, USA
Chief, Business & Labor Division

LCdr. E. W. Bradford, USN
Editor

Mrs. Cecilia Pollok McCormick
Associate Editor

Mr. Rick La Falce
Associate Editor

Mr. John E. Fagan
Art Director

Norman E. Worra, JO1, USN
Editorial Assistant

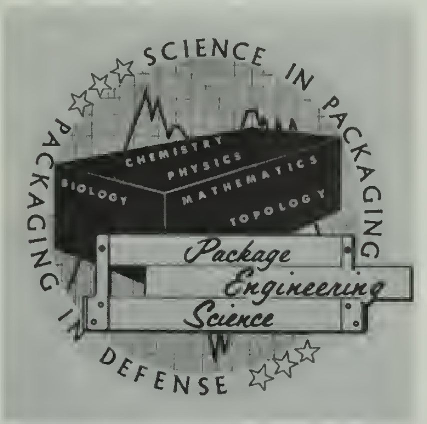
Solving Packaging Problems Through Research and Development

Dr. Edward A. Nebesky
Dr. Martin S. Peterson

A short and simple reason why the Army is interested in solving packaging problems through research and development is this: there is no other way to do it. A century ago packaging supplies for the combat soldier was the job of craftsmen, and the requirements were not much more rigorous than they were for civilian users. Today, military requirements for packaging are written in response to a revolution in the traditional concept of warfare—a revolution that has enormously increased the mobility of the Army, its firepower, and its capability for sustaining itself in combat.

To get down to cases, packages must be adapted to rapid, labor-saving materials handling media. They must protect their contents against agents of destruction totally unknown 100 years ago, and they have to fit snugly into sharply defined systems, *e.g.*, combat feeding systems. The tare weight of packages today is of vital concern—not one extra ounce can be tolerated. Higher strength of container materials is required without any increase in weight. Increased storage life, easier removal of contents, re-use after the initial use, better patterning of loads, proper safeguarding of chemical supplies, reduction in cost—these and many other problems can no longer be solved by the craftsman.

Packaging research at the U.S. Army Natick Laboratories has set forth on a dynamic, imaginative long-range program with an ambitious goal—complete correlation of packaging with the military product and military supply line operations. Increasingly, it is being recognized that there is no category of military equipment and supplies which can be held any longer at *status quo*. Containers must be based on new, or at least greatly improved, design and construction concepts and, equally important, be tailored to the requirements of the product (often a brand new product), of the transportation media (widely varied as to air, land and sea vehicles and cargo sizes and shapes), and of the environment (sharply different from one zone to the next, both in climate and terrain). Combat success depends on men, to be sure, but also on the efficiency and sufficiency of equipment and supplies in the "get thar fusteth with the mostest" principle.



The role of the container in keeping the supply stream flowing is too well recognized to be described here, but what may not be so well recognized is the need to lift packaging research and development to a level compatible with the impressive advances made, and being made, in materiel. Packaging is a science and, as such, is no different or no less important than product formulation, quality control, or processing (manufacturing) operations, and science must be put into packaging.

It was with this goal in mind that a new look at and a new approach to the U.S. Army Natick Laboratories' Packaging Research Program was recently taken, and a unified network of tasks under three coordinated projects drawn up.

Three Avenues to the Goal

The three avenues to the attainment of the packaging research and development goal are:

- Packaging performance evaluation.
- New packaging engineering systems.
- Applied container engineering development.

Under the first, container performance data derived during actual mobility supply operations will be collected and translated into container design and construction criteria. Under the second approach, the design of new packaging engineering systems, such advanced concepts as a universal container system, will be studied and implemented. Under the third, applications of container engineering developments to the packaging of products individually, by category, or in combination, will be made.

Since the bare description of these three approaches may not suggest anything particularly novel in the field of container research and development, it will be the next order of business to point out what is new in each of these pathways to the goal and the pay-off for the Army.

Packaging Performance Evaluation Criteria

The successive environments to which a container is exposed on its journey up to the front area range from mild to harsh. When loaded containers leave the factory shipping dock, the first leg of this journey is likely to be easy, with no more than the usual amount of jolts, vibrations and abrasions sustained in the domestic transportation of supplies. The next leg of the journey, shipment or transshipment overseas by plane or ship, may be but little more rough. When a container reaches its detination, say a port in South Vietnam, it leaves the world of well equipped transport media, smooth supply routes, ideal climatic environment, and orderly handling, and enters on a new phase of its journey, the harsh part.

To evaluate packaging performance, the effects of the whole cycle of operations from factory to field, and in the field, under all types of adverse climatic and environmental conditions, must be collected and analyzed. This has never been done before in a systematic, scientific manner. Moreover, observations of actual packaging performance in the past have been visual, supplemented by tests after the facts.

What is needed, and what is already well under way, is an objective scientific system, one based on recording devices (placed in selected containers of a shipment) that will accurately measure the effects of physical and other environmental shocks. Once experimental data, obtained over a wide range of transport media, routes and regions, have been collected and analyzed, new laboratory test methods and techniques will be devised, correlating environmental effects with predictions of container performance. By these means, a science-oriented engineering capability for designing and constructing military containers can be achieved.

The term "science-oriented" applied to packaging research may be viewed a bit skeptically by the practical man, but it is by no means a pretentious description. A container structure that will stand up can be designed by almost anyone, but a container structure that will stand up to military supply line punishment is something else again. In the first place, a container has to be "optimized," *i.e.*, factors of money, materials, structural strength adequate (and not super-adequate) for the job, and a configuration suited to transport, handling, storing, and field use must be considered and brought to a proper balance. For example, take one area of concern, physical shock. A variety of physical forces impact on a container. What can be done to neutralize or at least modify those forces? The answer can only be found in structural analysis, a complex and difficult field. In another area, materials deterioration, the application of chemistry and microbiology is required. As to optimal configurations, the job has to be done by the mathematician or topologist. It is probable that the computer will have to be employed for many performance evaluation tasks.

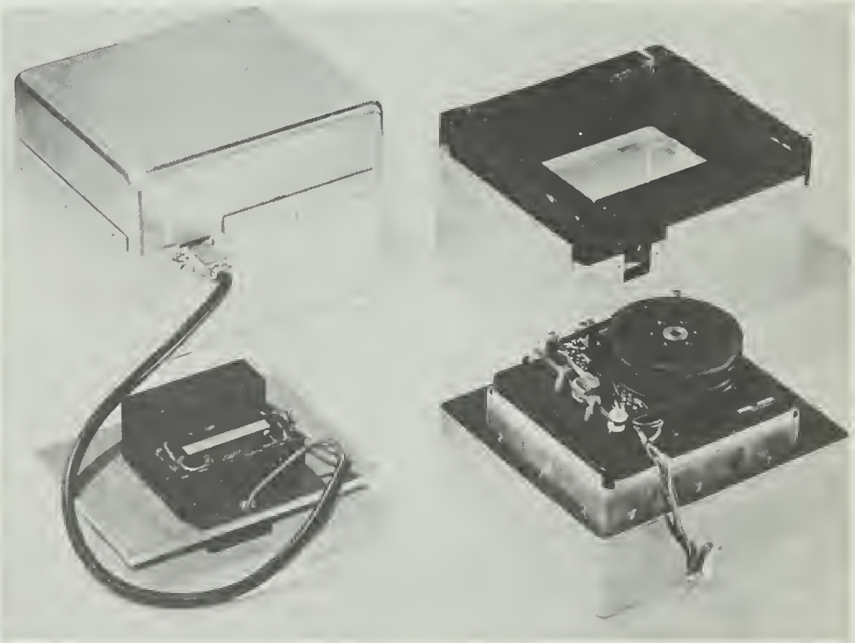
New Packaging Engineering Systems

The word "systems" is used here in a technical rather than a military sense. For example, a packaging system for radiated foods is a technical system that must fit into a military feeding system. Packaging engineering systems are not unknown today, but with advances in combat development systems we shall need to look ahead to a day when it will be possible, given the proper scientific and technological capability, to design and construct not a multiplicity of systems but a "universal container system"—capable of use in any military supply system and fitted well to the overall military supply system.

With the abundance of new packaging materials available today, with the new packaging methods being devised, with the new concepts of distribution, it is essential that the fabrication and construction of tomorrow's packages and containers be designed to incorporate the reliability and necessary protection of product for its intended storage life, mission purposes, and combat conditions. The time to start is now.

Applied Container Engineering Development

It is well accepted today that the container is as important as its contents. This statement is especially applicable to the complicated task of supplying the overseas military consumer. Unless the package carries the product safely to the user, the product might as well never have been made. Waste due to package failure is not only a waste of money, it is a waste of combat power. Moreover, since supplying the modern combat soldier calls for specialized containers, such as a containerized "B" ration, unitized on a meal basis, the business of engineering a package to respond to a specific military situation is firmly founded on the axiom that a product must not only arrive



Recording instrument for measuring shipping container performance during shipment and transshipment of supplies from point of origin to destination. The instrument records data on physical shocks sustained in transport media and storage.

Dr. Edward A. Nebesky is Acting Director of the General Equipment and Packaging Laboratory at the U.S. Army Natick (Mass.) Laboratories. Prior to assuming this position, he was Director of the Graduate Packaging Center at Rutgers University.

at its combat area destination but must also be quickly usable, *i.e.*, "openable and distributable" after it gets there.

For these reasons, the task of packaging research will be to analyze all military situations where packaging is a factor and devise packaging systems and methods responsive to military requirements. Heavy containers must be drummed out of the supply system. Wherever possible, we must take advantage of modern science and technology to design and construct lightweight containers; follow through, by close coordination with industry, to their construction; and keep constantly aware of their performance in the supply lines, under the mandate of the first approach, container performance evaluation. No packaging engineering system will be worth its salt, however, unless it interacts smoothly with the supply system which it serves, with tactics, and with overall strategy. In the past, cumbersome supplies have been known to bog down an army and cause its defeat. Modern packaging research can eliminate such a catastrophe.

Dr. Martin S. Peterson is a supervisory physical scientist at the U.S. Army Natick (Mass.) Laboratories. He entered Federal service in 1947 and from 1952 to 1960 was editor of two professional journals, Food Research and Food Technology.

Integrating the Three Approaches

Applied container engineering development, the third approach to the goal of a science-oriented packaging research program, is by no means isolated from the other two approaches. All three approaches are interconnected and interdependent.

To illustrate how this works, ideally, consider the concept of the universal container system. A very considerable body of performance evaluation data would be required and analyzed, before the criteria for this advanced system could be established. The optimal design will have to be determined, of course, by model analysis. Model analysis will involve:

- Particularizing broad intuitive assumptions concerning the model mathematically, by means of the computer.
- Studying each part of the system separately.
- Meshing the whole universal container system into the military supply system taken as a whole.

To restate this concept in more concrete terms, a universal container system will be one where each type of container not only does its job, but interacts with other types of containers to assist them in doing theirs. An example, no doubt farfetched in terms of today, would be a collapsible barracks, with equipment and supplies, all in one package. Nevertheless, we should be thinking in terms of the amount of work a given container can perform; how it can take over, in part, the work of another container; and how, by extending this principle, we can substantially reduce the burden on supply operations.

Some of the basic principles of a universal container system have already been vaguely outlined. Examples are: containerizing containers; standardization of container sizes and configurations; efforts to obtain a universal container material; the development of multi-use containers; and, thinking now of military systems and how a universal container system could mesh in with it, the increasing attention being given to the effect of one component of a system on all other components. Under the new packaging engineering systems approach, special attention will be given to this important modern principle of military supply systems just mentioned.

It need hardly be reiterated that, with these challenges ahead, packaging research must utilize all of the tools of modern science, technology, and engineering. The U.S. Army Natick Laboratories has made a beginning.

The Planning Philosophy of the New Long-Range Program

It should be evident from the foregoing account that the new plan does not try to tell the Army what it ought to have in the way of containers, nor to sell the Army on specific containers. The plan does call for an investment of scientific, engineering and technological effort that will be responsive to current and foreseeable military needs. The keystone of this planning philosophy is constant coordination of container development with military operational planning to assure that packaging research is fully abreast of progress in Army materiel. One important purpose of this article will have been fulfilled if we have made it clear how we are going to translate philosophy into achievement.

Naval Ordnance and Industry

On May 1, 1966, the Secretary of the Navy established the Naval Ordnance Systems Command as part of a major reorganization of the Navy. Now this stripling has the effrontery to celebrate its 125th anniversary!

Actually, Naval Ordnance has undergone a century and a quarter of continuous operation: Born as the Bureau of Ordnance and Hydrography in 1842, it shortly assumed the simpler title of Bureau of Ordnance. After 117 years of independent operation, the Bureau of Ordnance merged with the Bureau of Aeronautics in 1959 into the Bureau of Naval Weapons. The merger lasted only six and one-half years and then once again the Naval Ordnance Systems Command assumed its separate identity.

When we speak of the Naval Ordnance Systems Command, we are really referring to a team composed of the command itself as well as a tremendous segment of American industry. One of these segments alone could not have been responsible for the great progress that has always been the hallmark of Naval Ordnance.

Today the Naval Ordnance Systems Command takes special pride in such effective weapon systems as the Standard Missile, the Torpedo MK 46 and ASROC. Tomorrow there will be equal pride in newer weapon systems such as the Advanced Surface Missile System, the Torpedo MK 48 and the Extended Range ASROC. Industry, which has participated in and will continue to participate in so much of the effort for research and development and for production of these systems, must share this pride with the Naval Ordnance Systems Command.

The team relationship of the Naval Ordnance Systems Command and American industry is not one of master and servant by any stretch of the imagination. While it is true that the command, as the ordnance-procuring activity for the Navy, must set forth the Navy's requirements, it is also true that these requirements result from research by both members of the team. The hardware utilized by the Fleet was spawned in both Naval Ordnance and in private industrial laboratories. Even production of a single end item has been handled concurrently in a Naval Ordnance factory and in a private industrial plant and, in some cases, private industry has purchased Naval Ordnance factories and has completed the production of hardware which was in process at the time of purchase.

The Naval Ordnance Systems Command is a vast complex consisting of the headquarters, located in Washington, D.C., and a far-flung field organization. Although the Naval Ordnance-industry team works together at headquarters and in the field, this article will pertain to the activities of headquarters where the major programs are centered. Industry works with Naval Ordnance in the field in the same manner as at headquarters, so that a description of headquarters activities applies also to the field.

Naval Ordnance-Industry Relationship

The focal point of American industry's relationship with the Naval Ordnance Systems Command is the command's Contracts Office. The Director for Contracts operates the Industry Liaison Branch whose effort is devoted entirely to furthering the Naval Ordnance-industry team concept. For new industrial firms, for older firms which have not worked with Naval Ordnance before, and for firms that are veterans in working with Naval Ordnance, the Industry Liaison Branch provides an initial point of contact. It directs representatives of industry to the appropriate offices within or outside the Contracts Office for discussing the business at hand.

The Armed Services Procurement Regulation requires that bidder mailing lists be maintained "by purchasing activities to insure access to adequate sources of supplies and services . . . ."

The Industry Liaison Branch is the focal point for Naval Ordnance-industry review, and it is here that the Master Bidders List is maintained. Command purchasing officers use this list to solicit proposals, quotations and bids from contractors.

Companies make known their desire to participate in the procurement program of the Naval Ordnance Systems Command by mail or in person. In either case, they are given an explanation of the everyday mechanics of the procurement system, information on the general scope of the command's procurement program, and the method for applying for inclusion in the Master Bidders List. Each contractor receives application forms, an Industry Interest List, and is encouraged to give a full picture of his capabilities and facilities.

The Industry Evaluation Office routes each potential contractor's application to the cognizant technical and management personnel in the command for evaluation. After review, the firm receives notification of its status and any other information which may be appropriate in individual cases. The firm then knows the types of services or materials for which the command may solicit its offers.

Prospective manufacturers, who normally produce supplies and equipment not procured by Naval Ordnance, receive information as to which government activities may be interested in their production.

Two other functions connected with Naval Ordnance-industry relations are assigned to the Industry Evaluation Office. One is the synopsizing of proposed Naval Ordnance procurement in the *Commerce Business Daily*, a means of notifying industry for contracting or subcontracting. The other is the service of providing copies of solicitation documents, upon request, to interested suppliers who have not been included in the solicitations, but may have learned of them through the *Commerce Business Daily* or other sources.

The Contracting Officer

Within the Contracts Office, industry's major contact is with the contracting officers. A contracting officer awards every contract and, in each negotiated procurement, he and his assisting negotiators work directly with the contractor to formulate a contract which will provide the Government with the best possible contractual arrangement while, at the same time, paying the contractor a fair price for his services or materials.

The contracting officer is responsible for the negotiation of assigned procurements. The negotiation of contracts may involve such things as:

- **Overlapping or concurrent design, evaluation and production schedules.** Because of urgent requirements, it is frequently necessary to proceed with fabrication and evaluation of equipment without benefit of prior technical guidelines or concrete cost data. Overlapping costs, inherent in production of similar equipment adaptable to various concepts and configurations of installation, will require novel negotiating techniques in choosing the appropriate contract type and negotiating the pricing terms with the contractor.

- **Large dollar amounts.**

- **Long periods of time.** Design, development, fabrication, test, evaluation and modification of the equipment usually cover a period of three years or longer.

- **Complex equipments.** The equipment may require a series of contracts covering various phases of research and development from design and experimentation through development, service test, prototype and production stages. Overlapping of stages and changing requirements during all stages, as well as close interrelationships with other shipboard, airborne, or shore-based systems, make negotiation exceedingly difficult.

- **Concurrent and interrelated contracts.** Several contracts with different contractors are frequently related to design, development and fabrication of parts or equipment which are components of a complete weapon or weapon system. Changes in one contract frequently affect other contracts.

- **Complex procurements.** There are procurements for which a reasonably accurate price cannot be negotiated prior to performance of part of the work due to the unknown factors, or the lowest fixed price obtainable is not satisfactory to the negotiator. In such instances the contracting officer must decide upon the best type of contract for the situation. The selection of the proper type of contract is extremely important to prevent the Government from incurring excessive costs, and to maintain an incentive to the contractor to reduce costs.

Anti-submarine warfare combination ASROC with a torpedo Mark–46 payload is launched from the Destroyer USS Norfolk (DL–1).

The contracting officer conducts pre-negotiation conferences in order to avail himself of all points of view and information bearing on the negotiation. He may call upon any personnel in the command—engineering, legal, production, or other—and on cognizant field personnel, such as the auditor or inspector, for advice, information, or assistance. However, the contracting officer, personally, must determine the Government's position on the negotiation.

Because of the lack of meaningful cost and price information, the contracting officer may explore new and unusual avenues of approach in order to arrive at an equitable procurement. He must compare procurements made by other departments and agencies under the same or similar circumstances, making an analysis of the contract provisions and the policies and procedures behind them, and discussing them with top procurement personnel in the agencies involved and, in some cases, with the contractors.

The contracting officer conducts negotiations required to settle difficult problems which arise on existing contracts, *e.g.*, changes in scope of work or of the specifications, and negotiation of a government claim for price reductions and adjustments as a result of the failure of equipments to comply fully with warranties or guarantees.

Contract modifications changing the contractual requirements and approval of subcontracts are significant responsibilities of the contracting officer. It will be necessary, in many instances, to negotiate modifications for the procurement of end-item hardware which, because of critical delivery dates for long-lead-time items, is to be produced simultaneously with the design and development of engineering models for the same equipments. Numerous subcontracts are a common thing under this and similar contractual documents. It is the negotiator's responsibility to assure that the contractor has a sound make-or-buy and subcontracting program, and that subcontracts are properly awarded and priced.

The contracting officer periodically visits the command field representatives and other DOD field representatives who participate in the administration of contracts under his cognizance. He reviews with the field representatives the procedures used in the administration of contracts and approval and surveillance of certain subcontracts. Information, guidance and advice are continually being exchanged by phone.

The contracting officer in headquarters is the procuring contracting officer. The field representative is the administrative contracting officer. Both contracting officers—procuring and administrative—work as a contracting officer team. The administrative contracting officer assures that contract terms established by the procurement contracting officer are effected, and provides the procurement contracting officer with detailed information to be used in negotiating both basic contracts and contract modifications.

The Small Business Program

As a principal procurement activity, the Office of Small Business in the Naval Ordnance Systems Command aids, assists and counsels small business concerns to encourage their participation in the procurement of supplies and services within their capabilities. The small business specialist acts as the focal point within the command for all inquiries and requests for advice from small business firms on procurement matters. The Small Business Office also administers the Labor Surplus Area Program under which assistance is provided to concerns, located in areas of persistent or substantial labor surplus, in making the best use of their available resources.

Naval Ordnance operates a continuing program to locate capable small business sources for consideration in current and future procurement opportunities. Applications for placement on bidders lists, submitted by small business concerns, are screened to assure a thorough review of potential. Interested small firms are, thereby, given adequate consideration to compete for procurement opportunities within their performance capabilities. Wherever possible, the command participates in procurement conferences or clinics which may include seminars, exhibits and other efforts designed to acquaint businessmen with procedures and requirements for development of additional sources. Procurement conferences may include presentations to better acquaint industry with the technical objectives of the command.

The complex nature of the naval weapons and weapon systems may limit the potential of small business concerns as prime contractors. Consequently, many small firms are referred to field activities under the support of the Naval Ordnance Systems Command engaged in research, development, production and procurement of ordnance supplies or services. In some instances, the potential of a small business concern may be better suited as a subcontractor under the DOD Small Business Subcontracting Program. The program, which is mandatory in prime contracts exceeding $500,000 offering substantial subcontracting possibilities, is conducted by leading prime contractors to the command. The adequacy of the program is periodically reviewed to insure that the potentialities of small business concerns as subcontractors are considered fairly.

Numerous representatives of industry are in daily personal contact with technical personnel of the command. These contacts serve many purposes ranging from the presentation of new ideas to solving problems in current production. In connection with new ideas, the command welcomes unsolicited proposals which it receives and processes in accordance with the Armed Services Procurement Regulation.

The Technical and Systems Engineering Office is the principal developer and advisor for ship weapon concept formulation, the engineering technologies essential to support hardware design, ordnance safety, and ordnance packaging and handling. Effective design, protection and operation of weapon systems can be accomplished only through continuous, freely given cooperation between the Navy and industry, and between organizations within industry and within the Navy. These reciprocal efforts are promoted, required and utilized in many ways.

Artist's conception of the Mark–48 torpedo. Under development now, it is designed to combat modern, high-speed submarines at long range.

Liaison with Industrial and Technical Associations

Industrial and technical associations, such as the Aerospace Industries Association (AIA), the National Security Industrial Association (NSIA), the American Ordnance Association (AOA), and many others form a sounding board for securing, in advance, information concerning the needs for, and anticipated effects of Navy policies, procedures and decisions. For example, the Naval Ordnance Systems Command maintains liaison memberships on most of the groups and sections of the AOA, contributing through preparation of technical papers and participation in technical meetings. Specifications and standards for hardware, such as fasteners, as well as engineering practices, such as the use of standard screw threads, are developed cooperatively with such groups as the AIA, National Aerospace Standards Committee, The U.S. Standards Institute (USASI), Society of Automotive Engineers (SAE), and others. More specifications, written by the Government for end-item equipments, are being coordinated with industry during the regular coordination cycle to develop realistic requirements concurrent with the latest state of the art. This Navy-industry cooperation has improved the overall quality and acceptability of our military specifications. Information obtained in this manner is valued, used and appreciated by the command.

The command participates actively in officially recognized programs for the exchange of information. The Interagency Data Exchange Program (IDEP), for example, is a free interchange of technical information and environmental test data on parts and components used in the design of weapon systems between 176 military-space contractors and 69 government agencies to provide economy in contract expenditures and reliability assurance. The objective of IDEP is to have the data waiting for the engineer rather than to have the engineer waiting for the data.

The Failure Rate Data (FARADA) Program is a Navy, Air Force, Army and NASA-sponsored effort to provide parts and components failure rate and failure mode data to 246 government activities and contractors designing military and space equipment. Within the Navy, this effort is administered by the Naval Ordnance Systems Command.

Contract Administration

Value engineering incentive clauses in Naval Ordnance Systems Command contracts are gaining the interest of its contractors. The Armed Service Procurement Regulation has established requirements for value engineering in contracts which can significantly enhance the contractor's profits. Twenty-eight value engineers in headquarters and in field organizations support the contractors in considering "overall minimum cost to perform the function," which is the basis of value engineering application. As the central contact points in their respective areas, these engineers are able to expedite the evaluation of value engineering changes and their actual incorporation into weapon systems.

To insure that the Naval Ordnance Systems Command receives quality products in the most economical manner, particularly where complex weapon systems are involved, Navy Plant Representative Offices (NAVPLANTREPOs) are established within the premises of the private contractors' plants responsible for the manufacture and the delivery of end items.

Within each NAVPLANTREPO is an organization with full capability in the Defense Contract Administration Services (DCAS) areas of engineering, quality assurance, industrial facilities, and business administration. A team concept is employed which is dedicated to assisting the contractor in any appropriate way to perform fully and adequately all facets of the contract. With the advent of the DOD single cognizance program, NAVPLANTREPOs have been given the full responsibility of administering all contracts for the Defense Department in the plants in which they are located, in reality becoming DOD representatives rather than a single Service representative. Currently Naval Ordnance Systems Command NAVPLANTREPOs are established in Azusa, Calif.; Mishawaka, Ind.; Pittsfield, Mass.; Pomona, Calif.; Sunnyvale, Calif.; and Silver Spring, Md.

Several of the command directorates (major subdivisions) are charged with the development and production of hardware in assigned areas of material cognizance.

In the procurement of development effort, liaison with elements of industry begins with the initiation of the associated technical development plan. This liaison is on an informal basis with technical personnel to exchange information on the feasibility of various technical approaches and the availability of technology to meet the requirements of the program; and with management personnel to encourage and develop interest in the program. Technical personnel make many contacts with representatives of industry to determine capabilities for the work at hand and to encourage the interest of those considered capable, in order to obtain maximum competition.

In each case where doubt exists as to the capability of a prospective contractor, Naval Ordnance personnel visit the contractors facility to ascertain the availability of those requirements such as organization, experience, stability, etc., which are essential to the program. The purposes of these contacts is to limit the competition for this type of procurement to those elements of industry considered fully capable of meeting all of the requirements of the program.

In the procurement of production effort, contacts between the acquisition directorates and contractors are frequent, as both headquarters and field personnel provide technical administration of the contracts.

Very often the development of new hardware involves a three-way team, Naval Ordnance, a Navy or private laboratory, and a manufacturing facility. In an occasional case, one plant may serve as both laboratory and manufacturing facility.

Another area in which the command and industry work together closely is in bidders' conferences. The cognizant procurement planning officer or the cognizant contracting officer in the Contracts Office arranges such a conference with the first step of a two-step formally advertised procurement, or in connection with a negotiated procurement. At the conference, the planning or contracting officer, assisted by command technical personnel, answers questions by prospective bidders to enable them to submit effective bids, quotations, or proposals by learning more specifically of the command's requirements.

The Industrial Readiness Program

An active industrial readiness planning program is necessary to insure full wartime benefits from industry's vast production potential. The ability of industry to respond rapidly to increased demands is of vital importance to the nation's security. Accordingly, the mission of the Naval Ordnance Systems Command's Industrial Resources Division is to assure that adequate industrial resources are available to support the demands of the Fleet under peacetime and combat conditions. With this mission the industrial mobilization objective is to further develop, improve and maintain a critically selective, flexible industrial capacity responsive to limited and general war requirements.

Responsiveness is contingent upon the validity of industrial readiness planning with the contractor, and his ability to react to unforeseen production demands. This involves:

- Production planning with industry.
- Maintenance of stand-by facilities in ready condition.
- Maintenance of stand-by plant equipment.
- Priorities allocations and urgencies.
- Materials stockpiling.
- Industrial preparedness measures.

Planning with industry includes the development and continuous updating of a mobilization production capacity. Mobilization schedules mesh with a manufacturer's peacetime production of both military and essential civilian items. The value of this voluntary planning with industry is evident in the rapid response to Vietnam consumption.

Maintenance of previously used government-owned production facilities is another necessity for reactivating and beginning production as emergency wartime needs arise. A typical example is the $22 million government-owned Hays Plant at Pittsburgh, Pa. After pilot production of shells and projectiles, the plant was placed in stand-by for 10 years at a total maintenance cost of under $500,000. The Army acquired the plant on a use agreement from the Naval Ordnance Systems Command, and produced 105mm shells in less than two months. Without this base, serious production problems would have existed.

Since plant equipment is needed to support a mobilization capacity, it is also necessary to maintain previously used, but now idle, government-owned production equipment to meet military demands after M-Day. In addition, there are many active government-owned tools used by industry for heavy extrusion and press forging which can be readily converted to support wartime needs. Using criteria to assure amortization in three and one-half years, a continuing replacement and restoration program is in effect for production equipment. This modernization assures immediate cost savings, and at the same time increases readiness for the Naval Ordnance investment of $470 million.

Priorities and allocations are administered by the Industrial Resources Division under regulations issued by the Business and Defense Services Administration (BDSA) of the Department of Commerce. There are two separate but closely related functions: by use of priorities authority, the Defense Materials System (DMS) assures that materials, components and end items required for Fleet support are produced as scheduled; and through allocation of steel, copper, aluminum and nickel alloys, a system of control is in operation on a stand-by basis to permit expansion when an emergency situation develops. The Military Urgency List (MUL) contains relative urgency guidance on current procurement programs to resolve a conflict in demand for industrial resources among military programs.

The Office of Emergency Planning (OEP) develops projections of stockpile objectives of strategic and critical materials needed to support mobilization production requirements. In addition to the responsibility for control of these materials, the Industrial Resources Division generates projections of strategic and critical ordnance material requirements to meet the demands of the Fleet.

Manufacturing processes, manufacturing techniques, and plant equipment requirements must be developed on a timely and economical basis to ensure a state of readiness to meet both peacetime and mobilization needs. Industrial preparedness measures are initiated to preclude production bottlenecks. Resource studies, mass production techniques, and pilot production lines are continuously evaluated by Naval Ordnance engineers to resolve manufacturing problems before an emergency situation develops.

The Naval Ordnance mission then is to weld these various programs into a cohesive package in which each serves a clearly defined purpose, and in which each has an objective consistent with the overall philosophy of mobilization and management of the nation's industrial resources in the interest of national security.

Naval Ordnance works with industry in countless ways. Beyond doubt Naval Ordnance and American industry are a going team, each complementing the other, and going forward to produce better and better services and supplies for the Fleet.

DASA Moves to New Headquarters

The Defense Atomic Support Agency (DASA) has moved its headquarters from the Pentagon to the Thomas Building, at the corner of North Court House Road and North 14th St., Arlington, Va.

DASA conducts the Defense Department's nuclear weapons programs. It is a direct descendant of the Manhattan Engineering District which developed the nation's first atomic bomb.

The new DASA address is: Department of Defense, Defense Atomic Support Agency, Washington, D.C. 20305.

C–5 Aircraft Dubbed Galaxy

"Galaxy" has been assigned as the popular name of the new U.S. Air Force cargo aircraft C–5 being built by the Lockheed Marietta Co. The name was selected by Lockheed employees in a contest and approved by the Air Force.

FROM THE SPEAKERS ROSTRUM

Address by Hon. Paul R. Ignatius, Asst. Secretary of Defense (Installations & Logistics), at Annual Meeting of the National Aerospace Services Assn., Washington, D.C., May 2, 1967.

Hon. Paul R. Ignatius

Contracts for Technical Services

* * * * * * * * *

I would like to spend a few moments discussing a matter of current interest to you and to the Defense Department, namely, the respective roles of contractor and Government personnel in accomplishing certain needed services. Recently, both your association and the Department made formal statements to a Senate Committee on this subject. My purpose is not to examine the pros and cons of each item at issue, but rather to attempt to put the matter in proper perspective.

Late in 1964, DOD became concerned with certain contracts for technical services in which contractors' personnel were intermingled with government employees, received their orders and their work assignments directly from government supervisors, and were selected or discharged at the Government's option. The Civil Service Commission and the Comptroller General have issued formal opinions that these working conditions bring about an employer-employee relationship between the Government and the contract employees in violation of Civil Service laws and regulations, which specify other procedures and conditions for Federal employment. Secretary McNamara ordered a complete study of these contractual arrangements. The study disclosed some situations which appeared to involve irregularities discussed by the Civil Service Commission and the Comptroller General opinions, that the work involved could be performed at less cost by government employees, and that some of these contract positions should be converted to government employment in any event for reasons of military readiness. As a result of these findings, the Military Departments were requested to convert about 10,500 contracts positions to government employment and about half of these positions have, in fact, been converted. The remaining contract positions are being converted as quickly as possible.

Some of the companies affected by these decisions have offered several objections to the actions being taken. The validity of the opinions issued by the Civil Service Commission and the Comptroller General has been challenged. Fears are expressed that the conversion program really is not limited to 10,500 positions and that, in fact, the Government's long standing policy of relying on the private enterprise system is being abandoned. These companies also have questioned the basis for our conclusion that certain contract positions should be converted for reasons of military readiness. And, finally, our general conclusion that the Government can save money by converting these contracts to government employment has been challenged. . . .

Commercial Sources Needed for Products and Services

First, it seems hardly necessary to emphasize that neither the Defense Department nor the Government as a whole has abandoned the general policy of obtaining the products and services we need from commercial sources to the maximum extent consistent with effective and efficient accomplishment of our programs. For the past 13 years, that general policy has been expressed formally in guidelines issued by the Bureau of the Budget at the President's request. The most recent statement of the general policy is contained in Bureau of the Budget Circular No. A–76 which was issued about a year ago. The Defense Department participated in developing the circular. Let me give you several recent examples of our application of the general policy the circular establishes:

- Responsibility for operating the gas production plant at Portsmouth Naval Shipyard is being transferred from the Navy to a commercial firm.
- Responsibility for assembly of motors for the folding-fin aircraft rocket is being transferred from the Navy to a commercial electronics firm.
- Responsibility for production of parachute flares is being transferred from the Naval Ammunition Depot at Crane, Ind., to a commercial firm.
- Responsibility for maintaining and operating the administrative telephone system at McClellan AFB has been transferred from the Air Force to the telephone company which has the common carrier franchise in the area. Similar actions have been taken at about 70 radar sites throughout the country and at Norfolk, Va.; Charleston, S.C.; Pensacola, Fla.; and several other naval facilities.
- Government operation of the motor pool at Brooks AFB has been

discontinued and the needed services are being provided by a commercial firm.

There seems to be a belief among some groups that the Federal Government originally relied primarily upon the private enterprise system for all its requirements, but that the trend in recent years has been to rely more on government-owned and operated facilities. In fact, of course, the opposite has been the case. During the first hundred years of our nation's existence the Federal Government, and particularly the Military Departments, relied heavily upon government arsenals and other facilities of a similar nature. Only in fairly recent times have we learned to rely primarily upon private industry to provide the weapons, supplies, equipment and services we require. Many of the government arsenals and similar plants were established in the nineteenth century. Under Secretary McNamara's administration of the Department, there has been an intensive effort to get rid of installations we no longer need. Our list of base closures includes 66 industrial plants. Here are some examples:

- The Naval Ordnance Plants at York, Pa., and Macon, Ga., were sold to private companies in 1965.
- Three helium production plants at Moffett Field, Calif., at Lakehurst, N. J., and at Santa Ana, Calif., were closed in 1965 because our helium requirements could be provided commercially.
- Also in 1965 we announced closure of two ocean terminal facilities at Norfolk, Va., and at New Orleans, La., because the tonnage could be shipped via commercial facilities.
- The Army arsenal at Watertown, Mass., is to be closed next September and the arsenal at Springfield, Mass., is scheduled to be closed next March. The primary reason for ordering closures was that the artillery weapons, small arms, machine guns and mounts made in these plants could be provided by commercial sources.
- Similar actions have been taken at the Naval Fuel Annex at Richmond, Calif., at the Naval Fleet Annex in East Boston, Mass., and at the Army's St. Louis Ordnance Plant.

Clearly, it seems to me, the Department has indicated by actions as well as words that it fully supports the general policy of relying upon private enterprise for its needs.

Current Conversion Program not Expected To Change

I cannot assure you that conversions from contract to government employment will not be made in selected instances where the facts indicate that this is the wisest course of action. But I can tell you that our current conversion program is not expected to be changed.

Let us examine the current conversion program in more detail. It is limited to those contracts for technical personnel in which the Government retains responsibility for selection, suspension, assignment of work, and evaluation of performance of contract employees to such a degree that an employer-employee relationship is established between the Government and the employees. When these conditions are found to exist, they must be corrected by restructuring the contract (if that can be done economically) or by converting the positions involved to Federal employment. Such contracts have, in fact, been restructured in many instances.

There is one exception to this policy which applies to contracts for engineering and technical personnel. These contracts involve training, instruction and advice in the installation, operation and maintenance of weapons, equipment and systems used by DOD components. We have concluded that the Defense Department should have a direct capability to perform these functions as soon as the equipment becomes operational in the field or, if that is not feasible, within one year after it has become operational.

We have no reason to believe that the total number of converted positions will exceed the 10,500 in our current estimates. It should be clearly understood, however, that the General Accounting Office, as well as our own auditing and management analysis staffs, will be conducting cost comparison studies to determine whether we are acquiring the services we need in the most economical manner. In some instances, these studies may indicate that services being provided by contract should be provided directly by the Government. But our analyses have indicated that more frequently the result will be to transfer activities now being performed by the Government to commercial sources. In either event, these decisions will not be related to the opinions of the Civil Service Commission and the Comptroller General, or to the conversion program we have been discussing.

The statements which representatives of your association have made to the Senate Committee on Government Operations indicated that you question the legal validity of the recent opinions by the Civil Service Commission and the Comptroller General. DOD has made no comment on the legal issue. One reason for this is that we would be bound by the Comptroller General's decision even if we did not agree with it. In addition, the types of contractual arrangements which were termed illegal in these decisions appear to be undesirable also from the standpoint of good management.

The Federal Government and, I believe, most businesses find it necessary to have salary scales and personnel policies, which will assure that employees performing the same kinds of work under similar conditions are selected and paid according to the same general standards; and that they receive consistent treatment with respect to retirement, leave, promotion, hours of work, overtime, etc. One of the primary purposes of the Federal Civil Service system is to assure that the Federal Government has such a personnel system.

Where contract personnel and government employees are integrated into the same organizations, reporting to the same supervisors, and doing the same kinds of work, the effect is that two personnel systems must be applied to the same group of employees. Employees, who appear to deserve the same kind of treatment from the standpoint of the work they are doing, are treated quite inconsistently. In most instances their salaries are not the same. Promotions cannot be based on merit except within each of the two systems being applied. The Federal employees are bound by the Hatch Act and the conflict of interest laws, whereas the contract employees are not. The two classes of employees receive different per diem allowances when they travel on official business. In foreign countries, the

Federal employees must pay Federal income taxes, whereas contractors' employees are exempted from such taxes after they have served in a foreign location for more than 17 months. Usually there are also differences in retirement benefits, insurance and health protection, allowances for annual leave, etc.

When contract personnel and Federal employees are so completely integrated into a government organization that they cannot be readily distinguished with respect to their work and supervision, these differences in the treatment they receive may cause difficulties and unsatisfactory operating, administrative and morale conditions—entirely apart from any legal questions which may also be involved. In view of these problems of administration and management, we believe we would not be justified in seeking legislation to set aside the legal opinions of the Comptroller General and the Civil Service Commission—at least not until we have done everything possible to solve our problems within the ground rules provided in these opinions.

Cost Comparison Analysis

Now, I believe I should discuss the basis for our conclusion that the Government can save money by converting the kinds of contracts we have been discussing to Federal employment.

This conclusion was based upon a cost comparison analysis completed early in 1965 as a part of the study initiated by Secretary McNamara which I mentioned earlier. The scope of this project included not only contracts for technical services personnel but also covered the entire field of base support activities, including many of the types performed by members of your association. One of the principal conclusions from this study was that a substantial variety of the base support activities, involving expenditures of about $430 million per year, which were being performed by the Government directly, could be performed by contractors at less cost to the Government. As a result, some of these services have been assigned to contractors and additional cost comparisons are expected to lead to reliance upon contractors.

These findings pertaining to base support activities were in sharp contrast to those pertaining to contracts for technical personnel. The study indicated that it was costing the Government about $119 million for 7,069 contract service personnel, and that the work could be performed by the Government directly for about $100 million.

One of the main reasons for the differences in estimated costs was that experience in the Army, and in a few other agencies, had demonstrated that a smaller total staff was needed after a mixed organization of contractor and government personnel was converted to Federal employment. For example, the Army had converted 889 contract positions to government employment from 1962 to 1965 and required 600 Federal employees for the work—an overall reduction of 289 employees. Similar results have been revealed in subsequent studies, such as one recently completed by the General Accounting Office involving the conversion of a contract at White Sands Missile Range in New Mexico.

I believe it is significant that the study revealed opportunities for worthwhile savings by relying upon contractors for base support services, whereas the same study, conducted by the same analysts, indicated that savings also could be achieved by converting certain technical service contracts to government employment. Why the seeming contradiction?

The answer, I believe, is that there are fundamental differences between these kinds of contracts. Most contracts for base support services provide that the contractor assumes the responsibility for managing his staff and equipment with enough efficiency to provide the required services and make a profit. The Government is relieved of the responsibility for managing the operation and may, in some instances, also be relieved of certain risks and costs, such as equipment losses, obsolescence and additional capital investments.

Contracts for technical personnel do not enjoy these advantages. The contractor furnishes only manpower and the Government continues to bear the responsibility for managing the operation and the risks and costs of obsolescence, equipment losses, etc. The Government also bears the additional responsibility for administering a contract, while the contractor has little opportunity or incentive to use his experience and ingenuity to reduce costs and improve efficiency.

I believe there are two lessons to be learned from this comparison. One is that a contract to furnish only a specified number of people is not likely to be very desirable from the standpoint of cost and efficiency. Another is that it is in our mutual interest to avoid this type of contract and to include the features of a typical base support service contract whenever feasible.

In summary, I hope I have made it clear that:

- DOD is fully supporting the government policy to place reliance upon private business for commercial and industrial products and services.
- The program to convert some technical service contracts is a special case that is necessary for a number of reasons and limited in scope.
- Cost comparisons will continue to be made of our industrial and commercial needs to determine whether they can be met most efficiently by government or contractor performance. These comparisons will undoubtedly results in shifts from government to contract performance, but the reverse may also be true in some instances.

Three Navy Labs Transferred to Naval Air Development Center

The Naval Air Development Center (NADC), Johnsville, Pa., assumed administrative control over three additional Navy laboratories on July 1. The laboratories affected are: the Aeronautical Materials Laboratory, the Aeronautical Structures Laboratory, and the Air Crew Equipment Laboratory; all were assigned to the Naval Air Engineering Center, Philadelphia, Pa.

The transfer of these laboratories to NADC is part of an overall Navy program of realignment of research, development, test and evaluation functions, and will enable the center to carry out its assigned mission in aerospace systems and aviation medicine more effectively.

The three laboratories will be redesignated as departments under the direct administrative and technical control of NADC. Their functions will not change.

Progress in SAIMS Subsystem Development

Colonel Herbert Waldman, USAF

Since September 1965 the staff of the Assistant Secretary of Defense (Comptroller) has been engaged in the design and development of improved information systems for use in the management of large weapon/support systems acquisitions. The Cost Information Reports (CIR) subsystem was the first to evolve as a direct result of these efforts. It was developed from the Cost and Economic Information System (CEIS) which had been formally conceptualized in July 1964. Other subsystems and techniques followed in 1966, generally serving to mark the path of evolutionary development of uniform procedures for the collection of information needed in DOD management. As new subsystems have been initiated they have replaced, as planned, procedures designed in the past which were not sufficiently effective to merit their continued use.

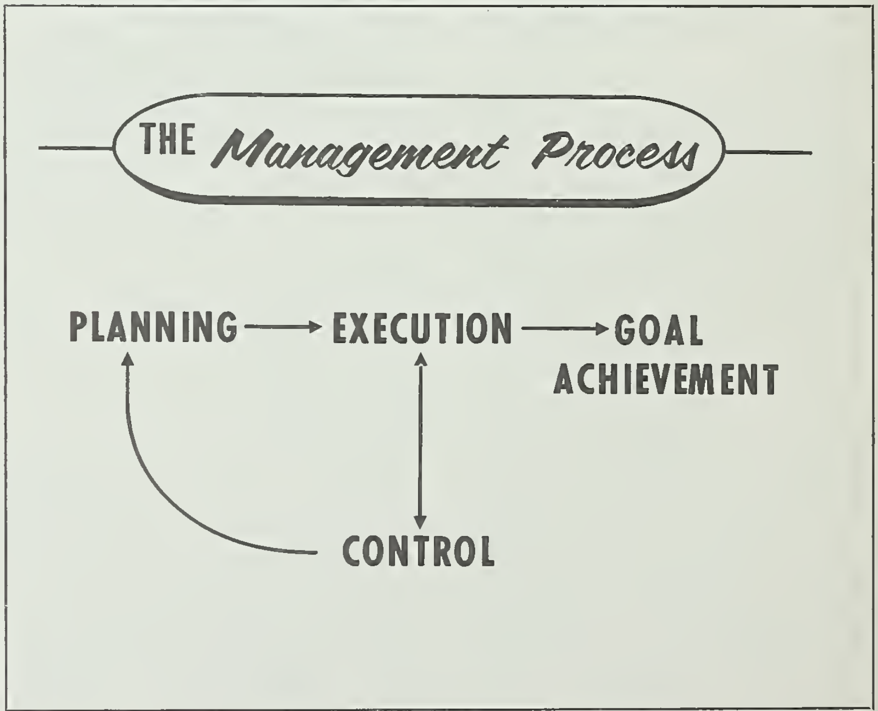
This is the nature of a continuing process in which an information subsystem is being developed for use to measure the progress of contractors' performance. The measurement process is oriented to provide the information which will support the capability to predict credible estimates of systems cost at completion, an area in which there have been marked deficiencies in past performance. This condition has persisted in spite of the fact that more attention is being given to work definition, and procedures have been specifically designed by each project manager to deal with this problem. The current effort to design an improved system, to be uniformly applied for this purpose, represents an evolutionary development of similar procedures generally in use by the Army, Navy and Air Force.

When a uniform system is installed throughout the Defense Department, each Military Department and Defense Agency will employ the same procedures under the Selected Acquisitions Information and Management System (SAIMS). The close relationship of the components of SAIMS to techniques and procedures now being utilized will also be of value in making possible a smoother transition in use, than would be the case if entirely new procedural content had been developed.

The central feature of SAIMS is the approach of using management control systems, developed by contractors, to produce the information DOD managers need to evaluate performance by measuring costs, and schedule and technical achievements in relation to plan. Such an evaluation will expose areas requiring explicit management attention. This effort, which is independent of Contractor Performance Evaluation (CPE), is concerned with acquiring information to better predict estimates at completion, on the basis of historical records of progress in performing the same contract to which those estimates are related. CPE is concerned with acquiring information to assess the credibility of a contractor's estimates (or proposals) on the basis of his achievement on prior contracts.

In performance measurement, the design efforts of the staff in the Office of the Secretary of Defense, which have been in process since 1965, resulted in the issuance of the draft of a requirements "package." This draft is now being circulated within defense industry, through the Council of Defense and Space Industries Association, for review prior to its adoption for DOD-wide use.

The key feature in the package is the statement of a set of criteria



for determining the acceptability of a contractor's system for controlling the accomplishment of the cost, schedule and technical requirements of the contract. As described, the criteria for Contractors' Cost/Schedule Control Systems include requirements for the following:

- Definition, description and grouping of all the work to be accomplished which is a source of contract cost.
- Assignment and identification of responsibility for work which generates contract costs.
- Planning and scheduling of work to be accomplished and changes made in plans and schedules.
- Establishing budgets for all activities which generate contract costs.
- Issuing work and resource authorizations and accounting instructions to performing activities.
- Accounting for costs of resource consumption in completed work, work-in-process, and for costs charged to overhead pools.
- Identifying what costs are planned to be, comparing them with actual costs, and explaining cost, schedule and technical variances including variances in forecasts and overhead data.
- Developing forecasts of costs at completion and fund requirements.
- Replanning, as necessary.
- Reporting management information to DOD managers from the same system that furnishes data internally.

In view of the fact that the contracts, which will be selected to be monitored using Contractors' Control Systems, involve considerable government cost-risk, some expenditure of resources to provide effective cost schedule control is justified by the potential for benefits to be derived from their operation.

To support the process of defining the work to be done in completing defense contracts and monitoring progress in accomplishing that work, the staff of the Office of the Secretary of Defense has also been developing uniform procedures for configuration management and work breakdown structure identification. The concept of a single work breakdown structure, when embodied in a contract, makes the flow of integrated information for management a practical possibility.

A work breakdown structure is the organized array which describes the components of a contract. The upper levels identify the various components or contract line-items to be furnished by the contractor. DOD managers provide the contractor with information when he begins the work which identifies the technical requirements of the components that the contractor is to produce. This portion of the work breakdown structure, with which contractors are constrained, is then extended based on the contractors' engineering in a desired way. The result indicates the products and organizations which are employed by the contractor to satisfy his contract obligations.

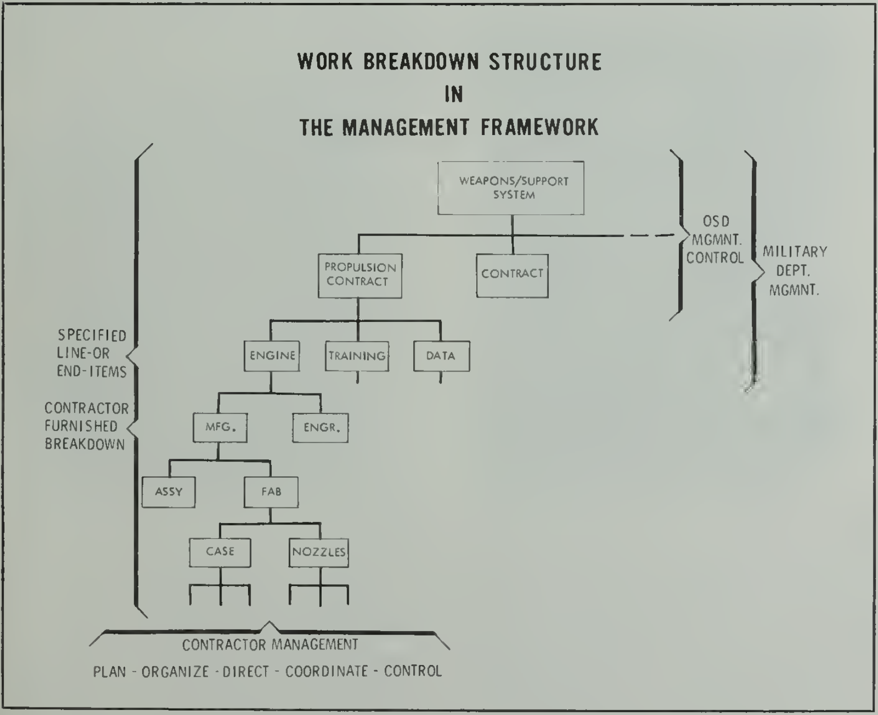


Figure 1.

This approach, using a single work breakdown structure and the contractors' accounting system, can be used to satisfy the various data requirements of SAIMS in meaningful fashion. The complete work breakdown structure indicates the relationship of the elements in the structure, which are specified by the Government, to the elements developed by the contractor. It also depicts the way in which data are accumulated from a single framework to meet various needs for information, including those of the contractor and of military managers. Figure 1 indicates in oversimplified fashion the relationship of the parts of a work breakdown structure to each other and some of the associated requirements for information. The information, which the Government obtains from the contractors' use of this framework, can satisfy the requirements for cost data, or for an identification of the hardware components that are aggregated to produce the end items called for in the contract. Although the aggregations represented in configuration or cost data arrays may differ, they represent data relationships only. They will be compatible at the upper levels with that single array called the work breakdown structure, which describes the interrelationship of the working elements of the contractors organization responsible for producing the products of the contract.

In the difficult task of identifying "significant" areas of application and "reasonable" measures to meet requirements, a glossary of terms has been developed. (The contents of the glossary are published at the end of this article.) Through its use it thus becomes possible to discriminate between semantic and substantive problems, and to work out necessary clarification of the description of control system requirements into the elements, *i.e.*, criteria or glossary, which are most directly associated with the source of the problems of understanding. Standard terminology, used at all levels of implementation, will be most helpful in resolving procedural questions which will inevitably arise.

As we seek to improve the information for management use, we must not lose sight of the fact that these requirements for improved management control are only a means to the desired end—the completion of DOD's contractual agreements with the greatest success and efficiency. Management control is only one aspect of the overall process we must accomplish in achieving that goal.

Glossary

Accrual Basis. The method of accounting whereby resources are charged as the cost of a given product (hardware, test, study, etc.) when they are consumed or applied to the product without regard to the date of payment or the date of acquisition.

Budgeted Costs. An estimate of future cost used to plan the use of manpower, material and other resources and provide a control over future operations. At any given time, the contractor may have authorized the consumption of resources above or below the Budgeted Costs in order to accomplish the required contract objectives. Such authorizations, although not based on contractual direction, may be referred to as "budgets" by the contractor, and in such instances must be reconcilable to Budgeted Costs.

Change Control. That element of a contractor's internal system whereby the impact of Contract Change Notices (CCN) and Supplemental Agreements (SA) can be traced, in terms of work content, measures of output, and resources budgeted, into the basic contractual effort. It is recognized that, although traceable, CCNs and SAs may lose their identity once incorporated into the basic work effort.

Contract Target Cost. The sum of all definitized costs authorized by the DOD contracting component.

Contract Target Cost Equivalent. The sum of all definitized costs and estimated costs for authorized work not yet definitized.

Cost Control Account. An identified level, within the work breakdown structure and organization structure, at which costs are collected in order to compare planned and actual direct labor costs, material costs and other costs for management control purposes. Within the scope of these criteria, it is also the level at which the contractor must be capable of comparing the planned costs of work accomplished with actual costs for purposes of specific variance analysis.

Cost Incurred. Costs charged to a cost control account on an accrual basis (see Accrual Basis).

Direct Costs. Any item of cost (or the aggregate thereof) which may be identified specifically with any objective, such as a product, service, program, function, or project; usually, but not necessarily, limited to items of material and labor. The distinction between direct and indirect costs is often arbitrary, or is based upon convenience and cost accounting simplicity without sacrifice of reasonable accuracy in overall costs of specific objectives.

Indirect Costs. An item of cost (or the aggregate thereof) which is incurred for joint objectives and, therefore, cannot be identified specifically with a single final objective, spect to the end-products, services, program, or project. A cost may be direct with respect to some specific service or function, the total cost of which is in itself indirect with respect to the end-products, services, programs, or projects. An indirect cost is usually allocated to the several cost objectives. More commonly referred to as overhead costs, burdens and/or general and administrative costs with the burden being apportioned over all products and services by an approved technique.

Colonel Herbert Waldman, USAF, is Director for Assets Management Systems in the Office of the Assistant Secretary of Defense (Comptroller). He holds a master's degree in business administration from the University of Michigan as well as a masters degree in international affairs from George Washington University.

Objective Indicators. Meaningful, auditable, discrete events which, by their occurrence, clearly signify to third parties the start, intermediate degree of accomplishment, and completion of a work package.

Overhead Work. Work that is not directly associated with products or work packages. Includes work of which only a portion is required to meet the contract obligations.

Overhead Units. Units that perform overhead work. Includes manufacturing activities which may not incur direct material and direct labor costs. (See Indirect Costs.)

Planned Cost. The allocation of total contract target cost to specified work derived from budgeted costs and budget reserves established by the contractor. When properly integrated the planned application of resources to accomplish specified work can serve as a meaningful basis for cost and schedule performance measurement and control.

Planned Cost of Work Accomplished. The sum of the Planned Cost of completed work plus a reasonable allocation of the Planned Cost of work-in-process based on criteria approved by the contracting DOD component.

Work Breakdown Structure (WBS). A product-oriented family tree division of hardware, software, services and other work tasks which organizes, defines and graphically displays the product to be produced, as well as the work to be accomplished in order to achieve the specified product. This forms a common, manageable framework against which to schedule, apply resources, establish planned costs, and measure progress.

Work-in-process. Work packages which have been reported as started

(Continued on inside back cover)

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

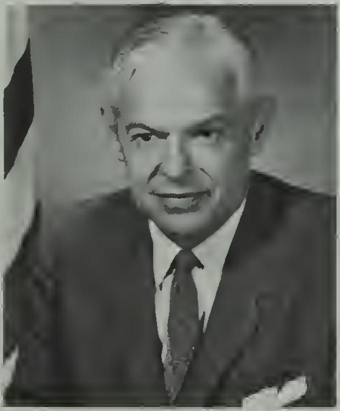
Paul C. Warnke has been appointed Asst. Secretary of Defense (International Security Affairs) succeeding **John T. McNaughton.** Mr. Warnke was formerly General Counsel of the Defense Department.

Dr. Gardiner L. Tucker has been appointed Dep. Dir. (Electronics and Information Systems) in the Office of the Dir., Defense Research and Engineering.

Dr. Peter Franken, who has been serving as Dep. Dir. of the Advanced Research Projects Agency since January, has been appointed Acting Dir. of the agency succeeding **Dr. Charles M. Herzfeld.**

Maj. Gen. Richard P. Klocko, USAF, has been named Dep. Dir., National Military Command Technical Support, Defense Communications Agency.

Maj. Gen. Ethan A. Chapman, USA, has taken over the post of Chief of Staff at Headquarters, North American Air Defense Command, Colorado Springs, Colo., succeeding **Maj. Gen. Mervyn M. Magee, USA,** who has retired.



Paul H. Nitze is the new Deputy Secretary of Defense succeeding Cyrus R. Vance, who resigned effective June 30, 1967. Mr. Nitze served as Secretary of the Navy from November 1963 and prior to that was Assistant Secretary of Defense (International Security Affairs).

Maj. Gen. Woodrow W. Vaughan, USA, has been designated Dep. Dir., Defense Supply Agency.

Brig. Gen. Robert J. Meyer, USAF, has been designated Dir., Aircraft and Missiles, Office of Dep. Asst. Secretary of Defense (Materiel), Office of Asst. Secretary of Defense (Installations and Logistics).

Brig. Gen. Robert C. Richardson III, USAF, Dep. Commander, Field Command (Weapons and Training), Defense Atomic Support Agency, Sandia Base, N.M., retired Aug. 1.

Don R. Brazier has been designated Comptroller of the Defense Supply Agency. He succeeds **Dr. Wilfred J. Garvin,** who has moved to a new position with the Small Business Administration.

Col. James T. Herbst, USAF, has been appointed Dep. Dir. of Freight Traffic, Military Traffic Management and Terminal Service, Washington, D.C.

Col. James T. Johnson, USAF, has been named Dep. Dir., Materiel & Services, Defense Communications Agency Planning Group.

DEPARTMENT OF THE ARMY

Gen. Ralph E. Haines Jr., was sworn in as Army Vice Chief of Staff and concurrently promoted to four-star rank in Pentagon ceremonies June 1.

Cyrus R. Vance resigned from the position of Deputy Secretary of Defense on June 30, 1967. In six and one-half years of service with the Defense Department, he was General Counsel and then Secretary of the Army before he became Deputy Secretary Defense in January 1964.

Lt. Gen. Harry W. O. Kinnard assumed command of the U. S. Army Combat Developments Command on July 1. He succeeds **Lt. Gen. Ben Harrell** who was reassigned as Commander, Sixth U. S. Army.

Lt. Gen. James K. Woolnough has succeeded **Gen. Paul L. Freeman** as Commanding General, U. S. Continental Army Command.

Maj. Gen. Charles W. Eifler has been appointed Commanding General, Army Missile Command succeeding **Maj. Gen. John G. Zierdt.**

Brig. Gen. James F. Hollingsworth has assumed duties as Dep. Commanding General, Army Test and Evaluation Command, Aberdeen Proving Ground, Md. He succeeds **Col. John F. Polk.**

William B. Taylor has been appointed Scientific Adviser, Missiles and Space Directorate, Office of the Chief of Research and Development, Department of the Army.

Three commodity managers have been appointed by Army Weapons Command. They are: **Frank X. Connolly,** Automatic Data Systems within the Army in the field; **George N. Burdick,** M102 howitzer system; and **Lowell B. McClain,** Commando V100, four-wheel drive, armored car.

Col. Robert B. Bennet has been assigned as Commander, U. S. Army Research and Development Group (Europe).

The Army Missile Command has assigned **Col. John G. Redmon** as Project Manager for the Hawk Missile System.

Col. John B. Stockton is the new Dir., Armor Materiel Testing, Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

Lt. Col. Eugene W. Dow has succeeded **Lt. Col. John W. Elliott** as Commander, Army Aviation Materiel Laboratories, Fort Eustis, Va.

Lt. Col. John W. Walker is the new Commander, Rocky Mountain Arsenal, Denver, Colo. He relieved **Lt. Col. Martin J. Burke Jr.**

DEPARTMENT OF THE NAVY

Lt. Gen. Leonard F. Chapman Jr., has been appointed to the post of Asst. Commandant of the Marine Corps. He replaces **Lt. Gen. Richard C. Mangrum**, who is retiring from the service.

Other assignments announced by the Marine Corps include: **Lt. Gen. Lewis W. Walt**, Dir. of Personnel and Dep. Chief of Staff for Manpower; **Maj. Gen. Richard G. Weede**, Commanding General, Fleet Marine Force, Atlantic; **Lt. Gen. Henry W. Buse Jr.**, Chief of Staff, Headquarters, Marine Corps, replacing Gen. Chapman; and **Maj. Gen. Ralph K. Rottet**, Dep. Chief of Staff (Plans and Programs) succeeding Gen. Buse.

RAdm. Herschel J. Goldberg, (SC), Commander, Naval Supply Systems Command and Chief of the Navy Supply Corps, retired Aug. 1. His successor is **RAdm. Bernhard H. Bieri Jr.** (SC).

Capt. A. H. Clancy Jr., Commanding Officer, Naval Air Engineering Center, Philadelphia, Pa., and **Capt. Paul F. Cosgrove Jr.**, Commanding Officer, Navy Fleet Material Support Office, Mechanicsburg, Pa., have been selected for promotion to the rank of rear admiral.

Capt. Clyde E. Fulton, (SC), has succeeded **Capt. Edward K. Scofield**, (SC), as Commanding Officer, Naval Supply Depot, Mechanicsburg, Pa.

DEPARTMENT OF THE AIR FORCE

Listed for retirement are **Lt. Gen. Herbert B. Thatcher**, Commander, Air Defense Command, and **Lt. Gen. Charles B. Westover**, Vice Commander Air Defense Command. Gen. Thatcher will be succeeded by **Lt. Gen. Arthur C. Agan Jr.** The new vice commander, replacing Gen. Westover, is **Maj. Gen. James C. Jensen.**

Lt. Gen. James W. Wilson has been appointed Vice Commander, Military Airlift Command, Scott AFB, Ill.

Brig. Gen. William C. Garland has relieved **Maj. Gen. E. B. LeBailly** as Dir. of Information, Office of the Secretary of the Air Force. **Brig. Gen. James F. Hackler Jr.**, former Asst. Dep. Chief of Staff, Operations, U.S. Air Force, Europe, has been named Dep. Dir. of Information.

Brig. Gen. William B. Martensen has been reassigned as Commander, Strategic Aerospace Div., Strategic Air Command, from duty as Asst. Dep. Chief of Staff (Operations), SAC Headquarters, Offutt AFB, Neb.

Brig. Gen. Robert W. Paulson has been named Commander, Air Force Communications Service, Scott AFB, Ill.

Assignments at Headquarters, U. S. Air Force, include: **Maj. Gen. Gerald F. Keeling**, Asst. Dep. Chief of Staff (Systems and Logistics); **Maj. Gen. George B. Simler**, Dir., Operations, Office of the Dep. Chief of Staff (Plans and Operations); **Brig. Gen. Sam J. Byerley**, Dep. Dir., Operations, Office of Dep. Chief of Staff (Plans and Operations); **Brig. Gen Leo A. Kiley**, Dir., Science and Technology, Office of the Dep. Chief of Staff (Research and Development); **Brig. Gen. James O. Lindberg**, Dir., Procurement Policy, Office of the Dep. Chief of Staff (Systems and Logistics); and **Brig. Gen. Andrew S. Low Jr.**, Asst. for Logistics Planning, Office of the Dep. Chief of Staff (Systems and Logistics); **Col. John L. Frisbee**, Special Asst. to the Vice Chief of Staff.

Col. Herbert L. Wurth has been assigned Chief, Public Information Div., Office of Information, Office of the Secretary of the Air Force.

Assignments at Air Force Systems Command (AFSC) include:

Maj. Gen. John L. Zoeckler, F–111 Program Dir. for the past four years, is reassigned as Dep. Chief of Staff (Systems), AFSC Headquarters; **Brig. Gen. Lee V. Gossick**, now serving as Commander, Arnold Engineering Development Center, Tenn., succeeds Gen. Zoeckler on or about Sept. 1; Gen. Gossick will be succeeded by **Brig. Gen. Gustav E. Lundquist**, who is now assigned as Dep. for Engineering, Aeronautical Systems Div.

Other AFSC assignments are: **Maj. Gen. John B. Bestic**, Commander, Electronic Systems Div.; **Maj. Gen. Harry E. Goldsworthy**, Commander Aeronautical Systems Div.; **Brig. Gen. William S. Chairsell**, Dep. Chief of Staff (Systems), AFSC Headquarters; **Brig. Gen. Fred J. Higgins**, Dep. Chief of Staff (Procurement and Production), AFSC Headquarters; **Brig. Gen. Clifford J. Kronauer Jr.**, Commander, Air Force Western Test Range; **Brig. Gen. David V. Miller**, Commander, Air Force Special Weapons Center, Kirtland AFB, N.M.; **Brig. Gen. Kenneth W. Schultz**, Dep. for Minuteman, Space and Missile Systems Organization.

The following colonels have been assigned to indicated AFSC posts: **Col. Lionel C. Allard Jr.**, System Program Dir. for 496L/474L, Electronics Systems Div.; **Col. George T. Buck**, Commander, Air Force Missile Development Center, Holloman AFB, N.M.; **Col. James L. Dick**, Dir., Air Force Avionics Laboratory, Research and Technology Div.; **Col. Raymond A. Gilbert**, Dir., Laboratories, AFSC Headquarters; **Col. Franklin J. Hickman Sr.**, Asst. Systems Program Dir., Long Line Communications, Electronics Systems Div.; **Col. David R. Jones**, Dir., Air Force Weapons Laboratory, Kirtland AFB, N.M.; **Col. William R. Morton**, Vice Commander, Air Force Special Weapons Center, Kirtland AFB, N.M.; **Col. Theodore E. Mock**, Dir., (Research and Technology), Dep. for Technology, Space Systems Div.; and **Col. Fred A. Shirley**, Systems Program Dir., RC–135 Aircraft, Aeronautical Systems Div.

Assignments at Air Force Logistics Command include: **Maj. Gen. Fred J. Ascani**, Dir. of Operations, AFLC Headquarters, Wright-Patterson AFB, Ohio; **Brig. Gen. Arthur W. Cruikshank Jr.**, Dep. Commander, Warner Robins Air Materiel Area, Robins AFB, Ga.; **Col. Selwyn J. Barefoot**, Dir., Procurement and Production, Ogden Air Materiel Area, Hill AFB, Utah; and **Col. Harvey H. Latson Jr.**, Dep. Civil Engineer, AFLC Headquarters.

Space and Missile Systems Organization Formed within AFSC

The Air Force Systems Command's Ballistic Systems Division at Norton AFB, Calif., and the Space Systems Division at Los Angeles AFS, Calif., were realigned on July 1, 1967, to form a new Space and Missile Systems Organization (SAMSO). The headquarters of the new organization is at Los Angeles Air Force Station, Air Force Unit Post Office, Los Angeles, Calif. 90045.

Most of the mission functions remain in their present locations at Norton AFB and Los Angeles AFS.

Major General John W. O'Neill, formerly commander of the AFSC Electronic Systems Division, is the commander of the new organization with duty station at Los Angeles AFS.

MEETINGS AND SYMPOSIA

AUGUST

Electroslag Consumable Electrode Remelting Technology Conference, Aug. 9–10, at Mellon Institute, Pittsburgh, Pa. Co-Sponsors: Mellon Institute and the Air Force Materials Laboratory, Wright-Patterson AFB, Ohio. Contact: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

FALL

1967 Conference on Speech Processing, dates undetermined, at Boston, Mass. Co-sponsors: Institute of Electrical and Electronics Engineers and the Air Force Cambridge Research Laboratories. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, phone (617) 274–6100, Ext. 3712.

SEPTEMBER

Second Symposium on Automatic Control in Space, Sept. 4–8, at Vienna, Austria. Sponsor: International Federation of Automatic Control. Contact: J. A. Aseltine, TRW Systems, Space Park Drive, Houston, Tex. 77058.

International Symposium on Information Theory, Sept. 11–15, at Athens, Greece. Sponsors: Air Force Office of Scientific Research, Information Theory Group of the Institute of Electrical and Electronics Engineers and the International Radio Scientific Union. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, phone (202) OXford 4–5261.

International Symposium on Materials—Key to Effective Use of the Sea, Sept. 12–14, at the Statler Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Advanced Composite Structures Symposium, Sept. 19–21, at Hilton Hotel, Denver, Colo. Sponsor: Air Force Materials Laboratory. Contact: Mr. Tomashot, (MAC), Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433, phone (513) 253–7111, Ext. 55317.

Eighth Symposium on Physics and Nondestructive Testing, Sept. 19–21, at Dayton, Ohio. Sponsor: Air Force Materials Laboratory, Wright-Patterson AFB, Ohio 45433.

Joint Power Generation Conference, Sept. 24–28, at the Statler Hilton Hotel, Detroit, Mich. Co-sponsors: Institute of Electrical and Electronics Engineers and the American Society of Mechanical Engineers. Contact: Carl Shabtach, General Electric Co., Schenectady, N.Y.

Seventh Annual National Conference on Environmental Effects on Aircraft and Propulsion Systems, Sept. 25–27, at Nassau Inn, Princeton, N.J. Contact: Robert A. Reale, Program Vice-Chairman, U.S. Naval Air Turbine Test Station, P.O. Box 1716, 1440 Parkway Ave., Trenton, N.J. 08628, phone (609) 882–1414, Ext. 224.

Fourth International Conference on Atmospheric and Space Electricity, Sept. 29–Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Science Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, phone (617) 274–6100, Ext. 3633.

OCTOBER

Twenty-second annual Transportation and Logistics Forum, Oct. 3–6, at the Biltmore Hotel, Los Angeles, Calif. Sponsor: National Defense Transportation Association. Contact: Les Richards, 3416 S. La Cienega Blvd., Los Angeles, Calif. 90016.

Conference on Reinforced Metal Matrix Composites, Oct. 10–12, at Wright-Patterson AFB, Ohio. Co-Sponsors: Air Force Materials Laboratory and the University of Dayton.

Eleventh Annual Organic Chemistry Conference, Oct. 12–13, at Natick, Mass. Sponsors: National Academy of Science-National Research Council, Advisory Board on Military Personnel Supplies, and Organic Chemistry Laboratory, Pioneering Research Div., Army Natick Laboratories. Contact: Dr. L. Long Jr., Head, Organic Chemistry Lab., (PRD), Army Natick Laboratories, Natick, Mass. 01760, phone (617) 653–1000, Ext. 414.

Conference on the Exploding Wire Phenomenon, Oct. 18–20, at Boston, Mass. Sponsor: Air Force Cambridge Research Laboratories. Contact: W. G. Chace, (CRFA), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274–6100, Ext. 4926.

Mass Transport in Oxides, Oct. 22–25, at the National Bureau of Standards, Gaithersburg, Md. Sponsor: Advanced Research Projects Agency. Contact: Dr. John B. Wachtman, Inorganic Materials Div., National Bureau of Standards, Washington, D.C. 20234, phone (301) 921–2901.

Conference on Unguided Rocket Ballistics Meteorology, Oct. 30–Nov. 1, at New Mexico State University, Las Cruces, N.M. Sponsor: Army Electronics Command. Contact: B. E. Britain, Atmospheric Sciences Office, Atmospheric Sciences Laboratory, White Sands, N.M. 88002, phone (505) 338–1006.

NOVEMBER

1967 Conference on Speech Communication and Processing, Nov. 6–8, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and the Institute of Electrical and Electronics Engineers. Contact: C. P. Smith, (CRBS), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, phone (617) 274–6100, Ext. 3712.

U.S.ARMY MA

WASHINGT

Area

OFFICE OF SP ASST FOR PROJ MGT.
COL. J. H. SCHOFIELD RM1730 OX 57945

OFFICE OF RESEARCH
AND LABORATORIES
DR. J. T. THOMAS OX 53596

COMMANDING GENERAL ----

DEPUTY COMMANDING GENERAL ---------

DEPUTY FOR RESEARCH AND LABORATORIES ---

CHIEF OF STAFF ----------------

DEPUTY CHIEF OF STAFF -------------

ASSISTANT TO THE DEPUTY COMMANDING GENER

SECRETARY OF THE GENERAL STAFF --------

HEA

DIRECTOR OF DEVELOPMENT
MG R. H. FREE (Acting) OX 74728

DIRECTOR OF PROCUREMENT
AND PRODUCTION
BG W. J. WOOLWINE OX 70627

'DIRECTOR OF MAJOR ITEMS
BG J. G. SCHERMERHORN OX 55521

DIRECTOR OF INSTALLATIONS AND SERVICES
COL. A. J. D,AREZZO OX 44035

DIRECTOR OF PERSONNEL AND TRAINING
MR. W. S. CHARIN (Acting) OX 59128

DIRECTOR QUALITY ASSURANCE
MR. S. J. LORBER (Actg) OX 77907

SPECIAL ASSISTANTS

NUCLEAR ACTVS	MR. J.L. CHAMBERLIN	OX 59739	CONG AFFAIRS	MR. PAUL CYR	OX 59504	DEP EMPL'T OFFICER	DR. R. G. H. SIU	OX 29
LABOR RELS	MR. A. COREY	OX 73162	PROJ MGT	COL. J. H. SCHOFIELD, JR.	OX 57945	MGMT SURVEYS	MR. O. O. TAYLOR	OX 66
CH SCIENTIST	DR. C. M. CRENSHAW	OX 59756	FIELD OPERATIONS	MR. JOHN SHADA	OX 76764	CH ENGINEER	MR. C. H. ZIMMERMAN	OX 27

CHAPLAIN
COL. R. W. JUNGFER, JR. OX 73604

COMBAT SURVEILLANCE OFFICE
MR. R. F. BRADY (Acting) OX 59123

TECHNICAL DATA OFFICE
MR. FENNER M. GRIMES (Acting) OX 72120

COL.

MAJOR SU

U. S. ARMY AVIATION MATERIEL COMMAND
ST. LOUIS, MO. 63166
(314) MA 2-8100
MG JOHN NORTON

U. S. ARMY ELECTRONICS COMMAND
FORT MONMOUTH, N. J. 07703
(201) 532 9000
MG W. B. LATTA

U. S. ARMY MISSILE COMMAND
REDSTONE ARSENAL, ALA. 35809
(205) 877-1100
MG CHARLES W. EIFLER

U. S. ARMY TANK-AUTOMOTIVE COM
WARREN, MICH. 48090
(313) 756-1000
MG WILLIAM W. LAPSLEY

August 1967

RIEL COMMAND

D. C. 20315

le 202

APRIL 1967

GENERAL F.S. BESSON, JR. OX 59154

LTG W.B. BUNKER OX 59006

DR. J. T. THOMAS OX 53596

VACANT

COL. J. B. CLARK OX 59574

COL. E. L. SNAPP OX 70615

COL. H. H. BRAUNSTEIN OX 5957B

OPERATIONAL READINESS OFFICE
COL. D. L. SALLEE (Actg) OX 77715

RTERS

DIRECTOR OF SUPPLY
BG T. H. SCOTT, JR. OX 50595

DIRECTOR OF MAINTENANCE
BG JOHN P. TAYLOR OX 50601

DIRECTOR OF TRANSPORTATION
COL REUBEN E. WHEELIS OX 56785

COMPTROLLER AND DIRECTOR OF PROGRAMS
(VACANT) OX 77897

DIRECTOR OF MANAGEMENT SYSTEMS AND DATA AUTOMATION
BG JACK E. BABCOCK OX 56600

DIRECTOR OF INTERNATIONAL LOGISTICS
MG J. M. FINN OX 54500

INSPECTOR GENERAL
COL. C. S. FREED OX 72876

INFORMATION OFFICER
COL. H. D. KIGHT OX 78691

JUDGE ADVOCATE
LTC J. E. MACKLIN, JR. OX 74609

GENERAL COUNSEL
MR. K. M. BARNES OX 52081

Y OFFICE
RLO OX 43700

AVIATION OFFICE
COL. W. B. DYER OX 71234

HISTORICAL OFFICE
DR. DALE BIRDSELL OX 54492

ADMINISTRATIVE OFFICE
COL. S. J. SAWICKI OX 59165

NATE COMMANDS

U.S. ARMY MOBILITY EQUIPMENT COMMAND
ST. LOUIS, MO. 63120
(314) AM 3-1100
BG E. I. DONLEY

U.S. ARMY MUNITIONS COMMAND
DOVER, N.J. 07801
(201) 328-4021
MG FLOYD A. HANSEN

U.S. ARMY TEST & EVALUATION COMMAND
ABERDEEN PROVING GROUND, MD. 21005
(301) 278-5201
MG L. G. CAGWIN

U.S. ARMY WEAPONS COMMAND
ROCK ISLAND, ILL. 61202
(309) 794-6001
BG W. J. DURRENBERGER

BIBLIOGRAPHY

RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

Others may purchase these documents at the price indicated from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

A Mixed Programing Formulation of a Weapons Allocation Problem. Ballistic Research Lab., Aberdeen Proving Ground, Md., Jan. 1967, 11 p. Order No. AD–645 813. $3.

Hardware Aids for Automata Design. Rand Corp., Santa Monica, Calif., for the Advanced Research Projects Aegncy, Dec. 1966, 36 p. Order No. AD–646 393. $3.

Adept—a Heuristic Program for Proving Theorems of Group Theory. M.I.T., for the Department of Defense, Sept. 1966, 181 p. Order No. AD–645 660. $3.

A Study of Shape Recognition Using the Medal Axis Transformation. Air Force Cambridge Research Labs, Bedford, Mass., Nov. 1966, 38 p. Order No. AD–646 258. $3.

Computer Science Research Review. Carnegie Institute of Technology, for the Advanced Research Projects Agency, Jan. 1967, 73 p. Order No. AD–645 294. $3.

The Development of the SDC System 360 Time-Sharing System. System Development Corp., Santa Monica, Calif., Dec. 1966, 22 p. Order No. AD–645 439. $3.

Manipulating Dates and Time Lapses in a Computerized Records System. USAF School of Aerospace Medicine, Brooks AFB, Tex., Sept. 1966, 17 p. Order No. AD–641 278. $3.

A Computer System for Inference Execution and Data Retrieval. Rand Corp., Santa Monica, Calif., for the Air Force, Sept, 1966, 32 p. Order No. AD–642 120. $3.

The Methodology of Control Panel Design. Bunker-Ramo Corp., Canoga Park, Calif., for the Air Force, Sept. 1966, 78 p. Order No. AD–646 442. $3.

The Role of Trial in The Acceptance and Adoption of New Equipment. Life Sciences, Inc., Fort Worth, Tex., for the Office of Naval Research, Aug. 1966, 69 p. Order No. AD–646 360. $3.

Increasing Team Proficiency Through Training. American Institutes for Research, Pittsburgh, Pa., for the Navy, May 1965, 61 p. Order No. AD–471 470. $3.

Human Factors Engineering Design Standard for Wheeled Vehicles. Army Human Engineering Labs, Aberdeen Proving Ground, Md., Sept. 1966, 187 p. Order No. AD–646 681. $3.

Resonant Beam and Ultrasonic Methods for Evaluation of Sintered Powder Steel Compacts. Springfield Armory, May 1966, 32 p. Order No. AD–646 580. $3.

Deep-Hole Drilling in the Manufacture of VKF Launchers. Arnold Air Force Station, Tenn., Nov. 1966, 15 p. Order No. AD–642 052. $3.

High Speed Deformation of Selected High-Strength Alloys: Effect on Mechanical Properties. Army Materials Research Agency, Watertown, Mass., Aug. 1966, 20 p. Order No. AD–640 023. $3.

Improved Cartridge Design Frankford Arsenal, Philadelphia, Pa., for the Air Force, Oct. 1966, 35 p. Order No. AD–645 273 $3.

Improvement of Forging Production: Generalization of Experience of Ural Plants. Translated from Russian by Translation Div., Wright-Patterson AFB, Ohio, July 1966, 200 p. Order No. AD–645 774. $3.

An Evaluation of the Spiral Point Drill Geometry. Rock Island Arsenal, Army Weapons Command, Rock Island, Ill., Sept. 1966, 34 p. Order No. AD–644 303. $3.

High Energy System (Organic Electrolyte). Electric Storage Battery Co., Yardley, Pa., for the Army, Sept. 1966, 126 p. Order No. AD–639 709. $3.

Battery Separator Mechanisms—Literature Survey Report. Naval Ordnance Lab., White Oak, Md., Sept. 1966, 48 p. Order No. AD–642 779. $3.

FC–2 Liquid Ammonia Reserve Battery. Naval Ordnance Lab., Corona, Calif., Nov. 1966, 61 p. Order No. AD–646 636. $3.

500 Watt Fuel Cell Powerplant. United Aircraft Corp., East Hartford, Conn., for the Army, Oct. 1966, 74 p. Order No. AD–640 700. $3.

Literature Survey on the Surface Structures of Refractory Metals with Reference to Thermionic Emission and Energy Converters. Northeastern University, Boston, Mass., for the Air Force, June 1966, 48 p. Order No. AD–636 954. $3.

GOVERNMENT PRINTING OFFICE PUBLICATIONS

These publications may be purchased at the prices indicated from:

Superintendent of Documents
U.S. Government Printing Office
Washington, D.C. 20402

Electromagnetic Spectrum Utilization—The Silent Crisis, A Report on Telecommunication Science and the Federal Government by the Telecommunication Science Panel of the Commerce Technical Advisory Board. A study of trends in the technology and use of the electromagnetic spectrum and an examination of various methods of increasing the telecommunication capabilities of the nation through more effective use of the electromagnetic spectrum. 1966. 85 p. Catalog No. C 1.2:E12. 50¢

Design Manual Changes. Contains changes to the Design Manuals whose criteria consist of direction and standards for procedures, methods, dimensions, materials, loads and stresses as used in the design of facilities under cognizance of the Navy Bureau of Yards and Docks (now Naval Facilities Engineering Command). These changes, covering more than one manual, are combined in single publications as listed below: NAVDOCKS DM–1, DM–6, DM–35, DM–36, July 1965 through June 1966. 1966. 228 p. Catalog No. D 209.14/2:3,25,26/ch. $1.25 NAVDOCKS DM–3, DM–25, DM–26, July 1965 through June 1966, 1966. 240 p. Catalog No. D 209.14/2:3,25,26/ch. $1.50 NAVDOCKS DM–50, Change 2, July 1965 through June 1966. 1966. 134 p. Catalog No. D 209.14/2:50/ch 2. 60¢.

Department of Defense Selected Economic Indicators

The table on page 22 shows selected financial and employment data related to the impact of DOD programs on the economy. The tabular data cover seven major subject matter areas, beginning with the first quarter of calendar year 1966 and continuing through the latest month for which information is available. Figure 1 below covers three areas—obligations, expenditures and contracts—by quarter year.

Explanations of the terms used in the table follow.

Military Prime Contract Award.

A military prime contract award is a legally binding instrument executed by a Military Department or Defense Agency (DOD component) to obtain equipment, supplies, research and development, services, or construction. Both new instruments and modifications or cancellations of instruments are included; however, modifications of less than $10,000 each are not included.

The series includes awards made by DOD components on behalf of other Federal agencies, *e.g.*, National Aeronautics and Space Administration, and on behalf of foreign governments under both military assistance grant aid and sales arrangements. It also includes orders written by DOD components requesting a non-defense Federal agency to furnish supplies or services from its stocks, *e.g.*, General Services Adminstration stores depots; from in-house manufacturing facilities, *e.g.*, Atomic Energy Commission; or from contracts executed by that Federal agency.

The series does not include awards paid from post exchange or similar non-appropriated funds, nor does it include contracts for civil functions, such as flood control or river and harbors work performed by the Army Corps of Engineers. Project orders issued to DOD-owned-and-operated establishments, such as shipyards and arsenals, are not included, but contracts executed by such establishments are.

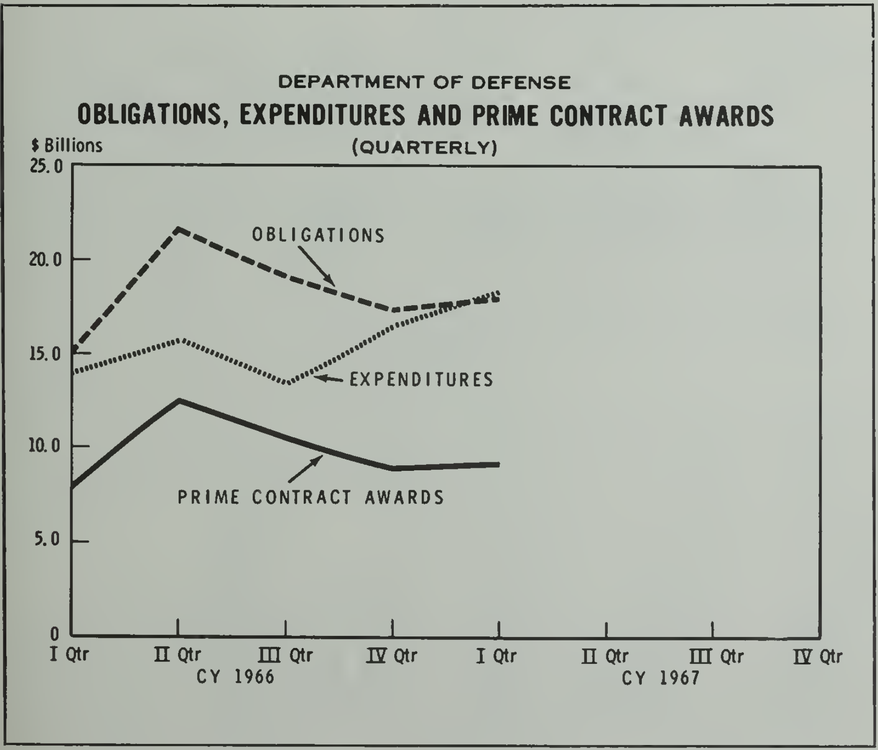


Figure 1.

The distribution by broad commodity group includes only contracts which are to be performed within the United States or its possessions. Each commodity group includes not only the indicated end item, but also associated components and spare parts, research and development, and maintenance or rebuild work. Electronics and Communications includes only such equipment and supplies as are separately procured by DOD components. Electronics procured by an aircraft prime contractor is reported as Aircraft. Other Hard Goods contains tank-automotive, transportation, production, medical and dental, photographic, materials handling, and miscellaneous equipment and supplies. Soft Goods includes fuels, subsistence, textiles and clothing. All Other contains services, *e.g.*, transportation, and all new contracts or purchase orders of less than $10,000 each. Commodity identification is not available for these small purchases.

Work done outside the United States refers to the location where the work will be physically performed. About 55 to 60 percent of this work is awarded to U. S. business firms, but a lesser percentage of the contract dollars in this category directly impacts on the U. S. economy.

Gross Obligations Incurred

Gross obligations incurred are total amounts recorded in official accounting records of the Military Departments and Defense Agencies from source documents, such as signed contracts or any instrument which legally binds the Government to payment of funds. Present coverage extends only to general fund accounts; obligations incurred in revolving funds are excluded. Included, and double-counted, are obligations which are recorded first when an order is placed by one appropriation upon another appropriation, and second when the latter appropriation executes an obligation for material or services with a private supplier. This duplication averages about eight percent of gross obligations.

SELECTED DEFENSE DEPARTMENT ECONOMIC INDICATORS

(Dollars in Millions; Manpower in Thousands; Quarters by Calendar Year)

	1966 I	II	III	IV	1967 Jan	Feb	Mar	I	Apr	May
I. *Military Prime Contract Awards*										
Aircraft	$ 1,945	$ 2,989	$ 2,696	$ 2,262	$ 784	$ 788	$ 530	$ 2,102	$ 432	$ 1,240
Missile & Space Systems	1,040	987	1,314	861	380	361	489	1,230	300	260
Ships	355	491	876	239	90	418	171	679	72	129
Weapons & Ammunition	555	1,486	692	940	346	215	257	818	279	518
Electr. & Communications Eqpt.	918	1,574	666	915	377	265	329	971	480	338
Other Hard Goods	843	1,842	660	1,029	267	305	343	915	298	362
Soft Goods	709	922	1,078	989	251	193	194	638	171	199
Construction	207	392	198	150	106	59	67	232	126	160
All Other	1,406	1,963	2,356	1,639	534	575	496	1,605	517	507
Total	7,978	12,646	10,536	9,024	3,135	3,179	2,876	9,190	2,675	3,713
Total, Seasonally Adjusted										
Work Outside U.S.	521	1,195	856	672	183	112	158	453	227	228
II. *Gross Obligations Incurred*										
Operations	8,326	9,604	10,426	9,702	3,495	3,226	3,508	10,229	3,664	
Procurement	4,374	8,539	5,368	5,276	1,738	1,451	1,924	5,113	1,801	
Other	2,429	3,470	3,453	2,230	823	774	922	2,519	726	
Total	15,129	21,613	19,247	17,208	6,056	5,451	6,354	17,861	6,191	
III. *Gross Unpaid Obligations Outstanding*										
Operations	3,828	3,867	4,792	5,024	5,041	4,892	4,644	4,644	4,761	
Procurement	18,203	21,944	22,736	23,173	23,134	22,982	22,780	22,780	22,613	
Other	5,898	6,709	8,051	7,627	7,557	7,469	7,228	7,228	7,159	
Total	27,749	32,520	35,579	35,824	35,732	35,343	34,652	34,652	34,533	
IV. *Net Expenditures*										
Operations	7,689	9,076	8,968	9,087	3,267	3,219	3,516	10,002	3,416	3,335
Procurement	3,651	3,886	4,392	4,264	1,680	1,491	1,903	5,074	1,783	1,850
Other	2,757	2,647	2,484	3,092	1,015	887	1,277	3,179	918	749
Total	14,097	15,609	15,844	16,443	5,962	5,597	6,696	18,255	6,117	5,934
V. *DOD Personal Compensation*										
Military	3,181	3,249	3,551	3,606	1,200	1,221	1,203	3,624	1,230	
Civilian	1,937	2,015	2,105	2,135	733	666	764	2,163	682	788 (p)
Total	5,118	5,264	5,656	5,741	1,933	1,887	1,967	5,787	1,912	
VI. *Outstanding Payments*										
Advance Payments	66	79	90	83				92		
Progress Payments	4,402	4,346	4,750	5,461				5,981		
V Loans	53	51	52	55				112		
Total	4,521	4,476	4,892	5,599				6,185		
VII. *Strength (Manpower)*										
Military	2,969	3,094	3,229	3,334	3,357	3,368	3,371	3,371	3,373 (p)	
Civilian	1,088	1,138	1,184	1,230	1,246	1,260	1,268	1,268	1,273 (p)	

(p)—preliminary.

Directorate for Statistical Services, OASD (Comptroller)
June 30, 1967

Operations. The Military Personnel appropriation and Operation and Maintenance appropriation of the Defense Department.

Procurement. The Procurement appropriation.

Other. The Research, Development, Test and Evaluation appropriation, and Military Construction, Family Housing, Civil Defense, and Military Assistance appropriations.

Gross Unpaid Obligations Outstanding.

Obligations incurred by DOD for which it has not yet expended funds.

Net Expenditures.

Gross payments less collections by the Military Departments and Defense Agencies, including military assistance. Payments represent checks issued.

DOD Personal Compensation.

Personal Compensation represents wages and salaries earned by personnel employed by DOD. Military compensation represents pay and allowances to active duty personnel; reserve pay and retired pay are excluded. Civilian compensation represents gross pay and includes lump sum payments for final annual leave. Both figures are inclusive of individual contributions to retirement and social insurance funds, but are exclusive of any employer contributions to these funds.

Outstanding Payments.

These are payments to contractors by the Military Departments and Defense Agencies made before the goods or services contracted for are completed and delivered.

Advance Payments. Payments to contractors in advance of performance of a contract.

Progress Payments. Payments to contractors as work progresses on a contract. These payments serve to reimburse the contractor for a major portion of the costs incurred to date.

V-Loans. Loans by commercial banks to defense contractors in advance of completion of work, in which the Government agrees to share any losses resulting from default.

Strength.

These figures represent the number of persons on active duty with DOD at the end of the period.

Military. Men and women on continuous or extended active duty. Excludes reserves on temporary active duty for reserve training.

Civilian. Direct hire personnel.

Contracts Compliance Office Transferred to Defense Supply Agency

The Defense Contracts Compliance Office, responsible for assuring equal opportunity employment on all defense contracts as required by Executive Order 11246, became a part of the Defense Supply Agency's Defense Contract Administration Services (DCAS) on July 1, 1967.

The transfer ties together, for the first time, the office responsible for elimination of discrimination by defense contractors and the contracting officials responsible for administering defense contracts. This direct relationship will assure increased effectiveness of the Defense Contracts Compliance Program. The Compliance Office headquarters has 22 civilian employees in Washington, D.C., and 149 field representatives located in cities across the country.

No change in the size or composition of the Compliance Office is anticipated. The Secretary of Defense has directed that the transfer assure that the separate identity of the Compliance Office and its personnel within the DCAS organization is retained.

Beginning in 1962, the three Military Departments and the Defense Supply Agency established separate contracts compliance offices. These were consolidated on July 1, 1966, under the Office of the Assistant Secretary of Defense (Manpower), with certain administrative support functions for the field offices assigned to the 11 DCAS regions.

Subsequent experience, supplemented by a detailed management survey, demonstrated that the 171-member contracts compliance organization, supported by and aligned with the DCAS nation-wide program, would be more effective and have a greater impact on defense contractors. Policy direction and guidance of the Contracts Compliance Program will be retained in the Office of the Assistant Secretary of Defense (Manpower) to assure continued high priority attention throughout DOD.

The Defense Contracts Compliance Office headquarters group is located in Room 8A 489, Building 8, at Cameron Station, Duke Street, Alexandria Va. Field offices will be located in the DCAS regions headquartered at the following cities: Atlanta, Ga.; Boston, Mass.; Chicago, Ill.; Cleveland, Ohio; Dallas, Tex.; Detroit, Mich.; Los Angeles, Calif.; New York, N.Y.; Philadelphia, Pa.; St. Louis, Mo.; and San Francisco, Calif.

USAF Civil Engineering R&D Goes to Kirtland AFB

All Air Force civil engineering research and development has been centralized at the Air Force Weapons Laboratory (AFWL), Kirtland AFB, N. M.

As the "lead laboratory" for civil engineering, AFWL will conduct or manage all exploratory and advanced development in this area, and will provide technical guidance and direction for the entire civil engineering program of the Air Force.

The new role of the laboratory will speed up vitally needed civil engineering projects in Southeast Asia and at Air Force installations world-wide. The laboratory's Civil Engineering Branch will carry out the new mission.

Navy Develops New Fire-Fighting Foam

A portable high-expansion, foam-generating system, developed by the Naval Applied Science Laboratory, will soon be delivered to fleet units and Navy fire-fighting schools.

The new foam system was developed to combat liquid fuel fires in engine, boiler and machinery spaces aboard ships.

High expansion foam, unlike conventional fire-fighting agents, can fill a ship's compartment in a few minutes, flowing over and around obstructions and engulfing fires.

The new agent can be applied from outside a compartment through a hatch opening, while conventional agents must be applied directly on a fire. A swivel-mounted door permits operators to direct the foam horizontally or vertically.

Report on Paris Air Show 1967

The Paris Air Show, held every other year at Le Bourget Airport, is the outstanding international forum for the display of aerospace technology. Participation at this event is motivated by a variety of goals and is in a variety of forms, from national pavilions stressing the state of various technologies to aircraft equipment manufacturers expecting to actually take orders for equipment; from Military Service acrobatic teams displaying their precision flying skills to company presentations geared to a specific customer audience. In short, every sort of exhibiting group attempts to educate every sort of customer audience. Paris 1967 was no exception to this.

U. S. participation at Paris 1967 represents the best planned and coordinated effort of U. S. Government and industry to date. Planning for this participation began almost two years ago and involved a major effort on the part of all agencies involved, especially the Department of Commerce. The Department of Commerce provided professional talent to organize and implement the unified U. S. participation. An impressive and strategically located U. S. pavilion, based on the theme of U. S. aerospace technology from Lindbergh's time until today, the 40th anniversary of Lindbergh's flight, housed displays by the Federal Aviation Agency, the U. S. Information Agency, the Environmental Science Services Administration, the Communications Satellite Corp., the Atomic Energy Commission, the National Aeronautics and Space Administration, as well as 16 major aerospace companies and 43 aerospace subsystem companies. (See list of participating companies on page 28.)

In terms of image, Paris 1967 was highly superior to previous U. S. participations. Special events in connection with the air show included a joint Government-industry reception hosted by the Ambassador, display of a replica of the Spirit of St. Louis at the U. S. pavilion, and the presence of two U. S. astronauts. Compared to Paris 1965, the United States received a very good press. President de Gaulle, scheduled for 10 minutes in the U. S. pavilion, spent 30 minutes, including a discussion with our astronauts. Meetings of U. S. and Russian astronauts were unofficially arranged and received wide press coverage.

The Defense Department static aircraft exhibit was certainly our most interesting and best balanced showing at Paris to date. It included:

- Exotic technical developments in aerospace like the F–111A variable geometry tactical fighter, the XC–142 tilt-wing VTOL transport aircraft, and the CL–286 rigid-rotor helicopter.
- In addition, seven other new aircraft, none previously shown at Paris, the OV–10A, A–7A, CH–53A, AH–1G, TA–4F, RF–4 and the HH–3E.
- Aircraft shown before at Paris representing potential to meet other nations' defense requirements or currently in use or on order by other nations, including the OH–6, CH–47, OV–1, UH–46, P–3A and C–141.
- Aircraft representing international defense and industrial cooperation like the UH–1 helicopter produced by Italy and the Federal Republic of Germany; the A–7A, planned to incorporate the British Rolls Royce engine (for the U. S. Air Force A–7D); the UH–46 helicopter under production in Japan; the F–4, currently being produced approximately 50 percent each in the United States and the United Kingdom for British requirements; and the F–5, now in production in Canada and Spain.
- Aircraft indicative of the civilian application of defense-designed equipment, including the OH–6 helicopter and its civilian counterpart, the Hughes 500 executive transport; the civilian version of the C–130 and C–141, the Lockheed 100 and 200, respectively; and the HH–3E representing the S–61 family of Sikorsky helicopters.
- Aircraft representing the gamut of size and propulsion from the C–141 transport to the OH–6 light helicopter; speed from the Mach-2-plus

F–111 tactical fighter to the STOL OV–10 close support attack aircraft; and missions from flying hospitals to reconnaissance at more than twice the speed of sound.

The 19 Defense Department aircraft, with their related civilian aircraft and flying displays, represented a complete picture of U. S. defense aviation. As the British press described the U. S. display, "Although the Russians have played all the aces . . . the United States holds the aircraft trump cards."

The following is a listing of the aircraft in the DOD display:

- **The U.S. Navy UH–46 Sea Knight which is the military application of the twin-turbine Boeing Vertol 107 helicopter.** The 107 is in use by the Royal Canadian Air Force and Army for search/rescue and troop transport; by the Royal Swedish Navy and Air Force for minesweeping, antisubmarine warfare, and search/rescue missions; and, through a Japanese licensee, by the Japanese Maritime, Ground and Self Defense Forces, and commercial operators.

- **The U.S. Army twin-turbine, medium cargo helicopter, the CH–47 Chinook.** Made by Boeing, it is soon to be delivered to the United Kingdom's Royal Air Force.

- **Currently in initial production by North American Aviation to meet U. S. Marine Corps and U. S. Air Force requirements, the OV–10 Bronco, shown at Paris for the first time.** In its present military version, as well as its potential cargo (or large hull) modifications, it should be of interest to many nations to meet a variety of requirements. The OV–10A was specifically designed for low-cost, close-in battlefield operations. Faster and more tactically versatile than helicopters, and slower but more maneuverable than jets, it utilizes tactics and provides capabilities not possible with either. STOL performance rough field landing gear, low maintenance/support requirements which permit operations from austere airfields, outstanding visibility, maneuverability over a wide speed range, rugged construction, complete air-to-air and air-to-ground communications, and flexible ordnance provisions make the Bronco effective for a variety of missions, including border patrol, helicopter escort, forward air control, armed reconnaissance, close air support and, with its 100-cubic-foot cargo bay and jeep-like operating characteristics, suitable for a variety of utility or nation building roles.

- **Produced by the Hughes Tool Co., the U. S. Army observation helicopter, the OH–6A Cayuse, shown along with its commercial counterpart, the Model 500 executive transport.** The turbine-powered Cayuse has set 23 official world records for speed, distance, climbing and sustained altitude—a feat never before attained by any other rotary-winged aircraft. The Hughes 500 offers businessmen faster point-to-point travel than fixed-winged airplanes with its ability to cruise for 450 miles at 150 miles per hour directly from one industrial heliport to another.

- **Two Sikorsky helicopters, the CH–53A and HH–3E, displayed at Paris for the first time.** The U.S. Marine Corps CH–53A, with a maximum gross weight of 42,000 pounds, cruise speed of 172 miles per hour and maximum speed of 195 miles per hour, is designed for a variety of missions, such as the transport of 48 fully equipped troops or 24 litter patients plus medical attendants. Another version, the HH–53B, is now in production for the U. S. Air Force. The U. S. Air Force HH–3E is a version of the Sikorsky S–61 family. It is assigned to the world-wide Aerospace Rescue and Recovery Service. Equipped with long-range fuel tanks and air refueling capabilities, the HH–3E can be deployed over long ranges for the rescue and recovery of downed airmen and returning astronauts. The HH–3E weighs 22,050 pounds loaded and cruises at 154 miles per hour. It has a 748-mile range without inflight refueling. Its refuel range capabilities were dramatically displayed by the non-stop, trans-Atlantic flight staged during the show.

- **The Lockheed Rigid Rotor Model 286, shown at Paris for the first time.** It is an FAA-certificated helicopter in direct descent of the XH–51A development, jointly sponsored by the U. S. Army and Navy and produced primarily to demonstrate the advanced state-of-the-art flying qualities inherent in this new rotor system. Its flight display included loops and rolls. An XH–51A aircraft, modified as a compound aircraft (with wings and auxiliary propulsion) was flown at more than 270 knots in the 1965 Paris Air Show. The XH–51A Model 286 and XH–51A compound helicopters were key stepping stones in the development of the Army's AH–56A, Advanced Aerial Fire Support System vehicles—the first of which was formally rolled out early in May of this year. This type of rigid rotor helicopter represents an im-

provement in rotary wing technology and should have an impact on the spectrum of military and civilian helicopter roles.

- **The F–5 Freedom Fighter, produced by Northrop Corp.** The aircraft is a supersonic tactical fighter in service with 10 allied nations—Iran, The Republic of Korea, Greece, The Republic of the Philippines, The Republic of China, Turkey, Norway, Thailand, Ethiopia and Morocco—and will be produced under license agreements by Spain and Canada, with Canadian-produced CF–5s going additionally to The Netherlands. The airplane is also under evaluation by Belgium, Denmark, Switzerland, Austria and New Zealand for possible acquisition. The F–5, like its sister aircraft the U. S. Air Force trainer T–38, provides high performance in a relatively simple, economical, safe, and easily maintained design. From its inception, the F–5 program was envisioned as an international program. Through a combination of advanced technology and operational simplicity, the F–5 reversed the complexity trend, while retaining full combat effectiveness.

- **The U.S. Air Force Military Airlift Command C–141 fanjet flying hospital transport aircraft, which is performing life-saving missions daily.** It can transport 80 patients with eight attendants. As a cargo carrier, it can airlift more than 70,000 pounds of equipment. It is the first jet with straight-in, truckbed level loading, enabling it to handle outsized cargo and take full advantage of mechanized loading systems. The C–141 Starlifter is a step forward from the C–130 Hercules propjet transport, which is in service with the U. S. Air Force, Navy, Marines, and Coast Guard, and with 14 other nations. A civil version of the Hercules, the Lockheed 100, which will transport 50,000 pounds of freight, was also on display along with the civil version of the C–141, known as the Lockheed 200. Several nations are considering acquisition of the C–141 and the Lockheed 200.

- **The U.S. Navy P–3 Orion, built by Lockheed.** This is the most advanced U. S. anti-submarine patrol and maritime reconnaissance aircraft. Equipped with electronic detector devices representing the latest state of the art, the long-range, land-based Orion protects the free world's sea lanes by operating from the U. S. Navy's Atlantic and Pacific Fleet outposts around the world. Orions are also in service in the Royal New Zealand Air Force and will join the Royal Australian Air Force early in 1968. Other navies are also considering the Orion for modernization of their airborne anti-submarine warfare and maritime patrol fleets. Acquisition and operation of the P–3 by New Zealand and Australia establishes a high degree of international cooperation and commonality in anti-submarine defense and establishes the P–3 as an international submarine hunter like its predecessor, the Lockheed P–2 Neptune, which flies in the anti-submarine warfare and maritime patrol forces of the United States and eight other free world nations.

- **One of the most dramatic aircraft at Paris 1967, the F–111 swing-wing tactical fighter, made by General Dynamics Corp.** Developed as an Air Force/Navy aircraft, it is capable, in its various configurations, of performing tactical fighter, tactical reconnaissance, carrier intercept, and long-range bombing missions. Its flexibility is the result of its radical swing-wing design, which provides high lift for minimum roll take-offs with maximum loads but low drag in the swept configuration for supersonic flight. This design feature is planned for inclusion in the Boeing-designed supersonic transport, as well as for the Anglo-French swing-wing fighter. The F–111A has been selected by Australia and the United Kingdom for inclusion in their defense forces and is currently being procured.

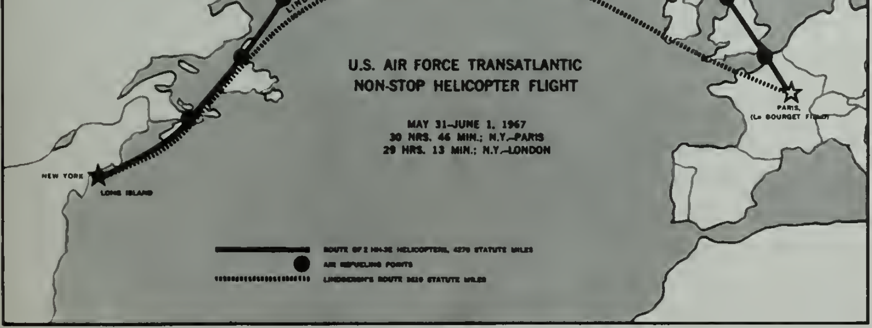
- **The Grumman E–2A Hawkeye, a twin-turboprop airborne early warning and intercept control aircraft in current production.** The prime mission of the Hawkeye is to detect high Mach number attacking aircraft at a point sufficiently distant to facilitate destruction before the attacking force can deliver its weapons. Designed for all-weather operations from aircraft carriers or shore bases, the E–2A patrols the extremes of defense perimeter. Its high resolution radar can detect attacking aircraft miles away, track and evaluate the attack, store and assemble the information, and relay it through high-speed data links to tactical controllers. It can also direct the interception of attacking aircraft. As a command and control vehicle, the system performs many functions automatically. The E–2A is easily identified by the huge saucer-like rotodome atop its fuselage containing the long-range radar antenna.

- **The F–4 Phantom, along with the Sparrow missile and advanced avionics, the best tactical fighter flying today.** The inherent flexibility of the Phantom's building-block design has made it readily adaptable to the defense and industrial needs of its users. It has been produced with eight marks of three different radars, seven marks of two different engines, five versions (marks) of three different air-to-air missiles, three alternative navigation systems, internal or external guns and over 20 optional equipment items. This building-block design and equipment flexibility has also made possible cooperative production programs for international customers. The British content in Phantoms for the Royal Air Force approaches 50 percent. It includes engines from Rolls Royce; aft fuselage, empennage and engine doors from BAC; outer wings from Short Brothers; fuel cells from Marston Excelsior; nav-attach systems from Ferranti; titanium blankets from Delaney Galley; ejection seats from Martin-Baker; reconnaissance pods from EMI and Hawker Siddely; hydraulics from Dunlop, Elector Hydraulics, and Hobson, Ltd.; and avionics from Ultra Electronics, Ltd., Standard Telephones and Cables, Normalair, Rotax, Louis Newmark, Elliott, Marconi Co., Cossor Electronics, Ltd., S. Smith, Sons, Redifon, and others. These systems are integrated into the F–4Ks and F–4Ms by the McDonnell-Douglas Corp. in a good example of a smoothly functioning international co-production program. The most recent model of the Phantom II, the F–4E, includes, in addition to the Sparrow and Falcon missiles, an internally mounted M–61 gatling gun which fires 20mm shells at the rate of 4,000 to 6,000 rounds per minute. One of the specialized versions of the McDonnell F–4, shown at Paris for the first time, is the U. S. Air Force and Marine Corps RF–4 reconnaissance aircraft. This aircraft has the latest sensor and photographic equipment. It is the most modern and complete reconnaissance aircraft flying today. It has been evaluated for possible use by the Federal Republic of Germany.

- **The A–7 Corsair II, shown for the first time at Paris.** This is the Navy version of this versatile aircraft, designed and produced by Ling-Temco-Vought. Its similarity in appearance to the F–8 Crusader aircraft, flown by the U. S. Navy and Marine Corps and the French Navy, reflects its derivation from that design. The Navy version, powered by the Pratt and Whitney TF30–P6 engine (in the 10,000-pound thrust category), is designed primarily for operation from the Navy's aircraft carriers. The U. S. Air Force has ordered the A–7D version of the same airplane with the Allison TF–41 Rolls Royce Spey engine. The Spey engine, which develops approximately 14,000 pounds of thrust, adapts the airplane with its large load-carrying ability and inherent long range to land-base and forward-field operations. Among the outstanding features of the A–7 is its long range/load capability and its ease of maintenance. Two Navy A–7A aircraft were flown non-stop, without inflight refueling, from Washington, D.C., to Mildenhall, England, near London.

- **The Grumman OV–1 Mohawk surveillance system, an Army tactical reconnaissance aircraft.** Flying in friendly skies, its side-looking radar (SLAR) provides the interpreter seated beside the pilot an image of ground targets in unfriendly territory about one minute after the picture has been taken. This near-instantaneous battlefield intelligence system allows constant following of the flow of battle. The SLAR can be used in all weather, day or night, without ever exposing the aircraft to enemy fire, although the OV–1, with its armor and its rugged and reliable construction, is clearly designed to be in the thick of the battle. For its tactical role it is also equipped with camera and infrared sensing devices. The OV–1 can perform over a wide speed range (it claims five world records for its class—one for closed circuit speed, two for time to climb, one for sustained altitude, and one for endurance) and is capable of rough field, forward area operation.

- **The XC–142 tri-Service V/STOL transport, shown for the first time at Paris.** Manufactured by Ling-Temco-Vought, it has successfully proven the feasibility of the tilt-wing turboprop concept for vertical take-off and landing of cargo-type transport airplanes. The tilt-wing concept has the dual advantage of carrying heavier loads with very short take-off and landing distances. The SC–142 is currently undergoing service tests by all three U. S. Military Services. The SC–142A is designed to carry 32 fully equipped combat troops or 8,000 pounds of cargo, utilizing the vertical take-off modes over an operational radius of approximately 230 statute miles. By using intermediate wing positions for short take-off and landing, greater loads may be carried for longer distances. The rear loading cargo door


U.S. AIR FORCE TRANSATLANTIC
NON-STOP HELICOPTER FLIGHT
MAY 31–JUNE 1, 1967
30 HRS. 46 MIN.; N.Y.–PARIS
29 HRS. 13 MIN.; N.Y.–LONDON
LINDBERGH'S GREAT CIRCLE ROUTE 3610 MILES NON-STOP
NEW YORK
LONG ISLAND
PARIS,
(Le BOURGET FIELD)
ROUTE OF 2 HH-3E HELICOPTERS, 4270 STATUTE MILES
AIR REFUELING POINTS
LINDBERGH'S ROUTE 3610 STATUTE MILES

permits full width access to the cargo compartment as well as facilitating air drops of cargo. The conventional cargo type parachute method has been demonstrated, as has a new technique of the "dump truck" wherein the fuselage is trimmed nose high and the cargo is permitted to free fall from a low altitude at the very low flight speed this design permits.

- **The Bell UH–1 Iroquois helicopter, a familiar aircraft since it is in use in 25 countries in both its military variations and the corresponding commercial configurations, the Bell 204 and 205.** More than 3,000 of these aircraft have been produced in the United States, and the aircraft is still in mass production. The UH–1 is also produced in Italy and the Federal Republic of Germany. Aircraft from the Italian production line, in addition to meeting Italian requirements, have been sold to Sweden, Netherlands, Switzerland, Saudi Arabia, Australia, Spain, Lebanon and Turkey. The UH–1 was the first turbine-powered helicopter and won 21 world records in 1964. It still possesses 19 of these records—11 for speed, three for time to climb, three for distance and two for altitude.

- **The AH–1G Cobra, developed by Bell based on the UH–1 design.** It has 50 percent commonality. The Cobra is the first helicopter designed specifically as a helicopter escort and fire-suppression helicopter. It was shown for the first time at Paris. The fuselage of the Cobra is only 36 inches wide.

- **The new Douglas A–4F (single place) and TA–4F (two place), the latest in the famous Skyhawk series of ground-attack aircraft being flown by the U. S. Navy and Marine Corps.** The Skyhawk was specifically designed as a rugged, easy to maintain light-weight, ground-attack bomber. The A–4s, operating from carriers, land bases, and short air-field tactical system facilities, have established an outstanding combat record for overall combat performance, ability to absorb battle damage, ease of maintenance and availability of up to 90 percent even under extreme field conditions. The TA–4F is being delivered to the U. S. Navy for use as an operational flight trainer.

Unlike Paris 1965, which was dominated by military aircraft, the United States this year also displayed numerous commercial aircraft including the prestigious stretched DC–8–61, the Lockheed 100 and 200 cargo aircraft, and the extraordinary Mini-Guppy.

In addition to participation by the U. S. Air Force Thunderbirds and the U. S. Navy Blue Angels, the Defense Department staged the first trans-Atlantic, non-stop flight of two HH–3E helicopters to Paris. The ocean-hopping Sikorsky HH–3Es, of the U. S. Air Force 48th Aerospace Rescue and Recovery Squadron, averaged 131 miles an hour, bucking headwinds for much of the flight. They were refueled in flight nine times by four HC–130P tanker planes.

Claims for world helicopter speed records—from New York to London and New York to Paris—have been submitted to the Federation Aeronautique Internationale, the ruling body for such records. Speed claimed was 30 hours, 46 minutes for the New York to Paris hop, and 29 hours, 13 minutes for the flight from New York to London.

The arrival of the HH–3Es at Le Bourget was the highlight of the air show's Helicopter Day. Appropriately, the theme for Paris 1967 was "In the Spirit of Lindbergh," in honor of Charles A. Lindbergh who, 40 years ago, made the first non-stop, trans-Atlantic solo flight.

List of Participating Companies in Paris Air Show 1967

Aerospace Companies

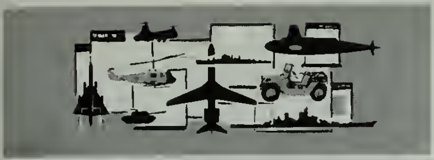
Beech Aircraft Co.
Bell Helicopter Co.
The Boeing Co.
The Garrett Corp.
General Dynamics Corp.
General Electric Co.
Litton Industries
Lockheed Aircraft Corp.
LTV, Inc.
McDonnell-Douglas Corp.
North American Aviation, Inc.
Northrop Corp.
Pan American World Airways
Trans World Airlines
United Aircraft Corp.
Wyman-Gordon Co.

Aerospace Subsystem Companies (Commercial Area)

Abex Corp.
Aeromaritime, Inc.
Aeroquip Corp.
Airco Supply Co.
Allen Aircraft Radio, Inc.
Ampex Great Britain
Anglo-American Aviation
Astra Aircraft Corp.
Atlantic Research Corp.
Baird-Atomic, Inc.
Bild Industries
Borg-Warner International
Brodsky, Hopf & Adler
Chicago Aerial Industries
Conductron Corp.
Del Mar Engineering Laboratories
Dorne & Margolin
Eastern Stainless Steel Corp.
General Connectors Corp.
General Precision, Inc.
Gray Co.
Hardman Tool & Engineering Co.
Hazeltine Corp.
Honeywell, Inc.
Inflight Motion Pictures
Laboratory for Electronics
Latrobe Steel Co.
Lawrence Electronics
Link Group (General Precision, Inc.)
Lockheed-California Co.
Motorola, Inc.
Northeast Aircraft Corp.
RCA Aviation Equipment Dept.
REA International Corp.
Ryan Aeronautical Co.
Schick Products
Standard Pressed Steel Co.
Stratoflex, Inc.
United Control Corp.
Voltron Products
Westinghouse Electric International
Wyman-Gordon Co.
Zep Aero

Aerospace Companies (Outside U. S. Pavilion)

Bendix Corp.
Cessna Aircraft Co.
Grumman Aircraft Engineering Corp.
Hughes Aircraft Co.
IBM Corp.
ITT Corp.
Kollsman Instrument Corp.
Martin Co.
Piper Aircraft Corp.
Rockwell-Standard Corp.



DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of June 1967:

DEFENSE SUPPLY AGENCY

1—**Page Airways, Inc.**, Rochester, N.Y. $2,015,746. Operation and maintenance activities at the Defense Industrial Plant Equipment Facility, Atchison, Kan. Defense Industrial Plant Equipment Center, Memphis, Tenn.

—**J. P. Stevens & Co.**, New York, N.Y. $1,721,250. 450,000 linear yards of wool serge cloth. New York. Defense Personnel Support Center, Philadelphia, Pa.

2—**Marmac Industries**, Marysville, Mich. $1,264,976. 368,674 steel-helmet liners. Defense Personnel Support Center, Philadelphia, Pa.

5—**Shell Oil Co.**, New York, N.Y. $2,041,597. Petroleum products and services. Defense Fuel Supply Center, Alexandria, Va.

—**Standard Oil Co. of Calif.**, San Francisco, Calif. $2,200,000. Fuel oil, gasoline and solvents for installations in Alaska. Defense Fuel Supply Center, Alexandria, Va.

—**International Paper Co.**, New York, N.Y. $1,220,903. 2,725,230 fiberboard boxes. Defense Personnel Support Center, Philadelphia, Pa.

6—**Gulf Oil Corp.**, Houston, Tex. $3,432,973. 14,244,000 gallons of fuel oil, 8,715,000 gallons of gasoline and 4,425,000 gallons of diesel. Defense Fuel Supply Center, Alexandria, Va.

—**American Oil Co.**, Chicago, Ill. $1,626,384. 9,858,000 gallons of gasoline, 115,000 gallons of fuel oil and 2,000 gallons of diesel. Defense Fuel Supply Center, Alexandria, Va.

—**Atlantic Richfield Co.**, Philadelphia, Pa. $1,304,474. 7,433,000 gallons of gasoline. Defense Fuel Supply Center, Alexandria, Va.

7—**Manteo Mfg. Co.**, Manteo, N.C. $1,432,074. 14,613 tent liners for medium-size general purpose tents. Defense Personnel Support Center, Philadelphia, Pa.

—**Usibelli Coal Mine**, Fairbanks, Alaska. $1,428,000. 272,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

8—**Vitro Minerals Corp.**, New York, N.Y. $1,412,500. 250,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

9—**Royal Lubricants Co.**, Hanover, N.J. $3,209,777. 831,229 gallons of aircraft engine lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

—**Aluminum Co. of America**, Pittsburgh, Pa. $3,366,000. 10,200,000 lbs. of aluminized powder. Defense General Supply Center, Richmond, Va.

12—**Dowling Bag Co.**, Valdosta, Ga. $2,305,900. 12,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

13—**Newell Clothing Co.**, Vineland, N.J. $1,133,932. Men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

14—**Cavalier Bag Co.**, Lumberton, N.C. $3,023,000. 16,000,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Consolibag Co.**, Philadelphia, Pa. $1,772,000. 8,800,000 osnaburg sandbags. Defense General Supply Center, Richmond, Va.

—**Pioneer Bag Co.**, North Kansas City, Mo. $1,305,590. 6,400,000 osnaburg and/or polypropylene sandbags. Defense General Supply Center, Richmond, Va.

16—**Davidson & Co., Ltd.**, Taipei, Taiwan. $3,446,398. 708,590 nylon pneumatic mattresses. Defense Personnel Support Center, Philadelphia, Pa.

—**Mauney Hosiery Mills**, Kings Mountain, N.C. $1,023,562. 3,389,280 pairs of men's black cotton-nylon socks. Defense Personnel Support Center, Philadelphia, Pa.

—**Ellis Hosiery Mills**, Hickory, N.C. $1,031,640. 3,600,000 pairs of men's black cotton-nylon socks. Defense Personnel Support Center, Philadelphia, Pa.

—**Evan Jones Coal Co.**, San Francisco, Calif. $2,704,800. 210,000 tons of coal. Defense Fuel Supply Center, Alexandria, Va.

21—**Hunter Outdoor Products**, Long Island City, N.Y. $1,198,781. 4,914 command post tents and 371 tent wall screens. Defense Personnel Support Center, Philadelphia, Pa.

—**De Rossi & Son Co.**, Vineland, N.J. $2,724,000. 150,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Tursini & Co.**, Vineland, N.J. $1,452,000. 75,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Cherribino Petti & Co.**, Atlantic City, N.J. $1,116,600. 60,000 men's wool serge coats. Defense Personnel Support Center, Philadelphia, Pa.

22—**Varian Associates**, San Carlos, Calif. $1,385,265. Transmitting tubes. Defense Electronics Supply Center, Dayton, Ohio.

23—**American Oil Co.**, Chicago, Ill. $1,166,373. 270,000 barrels of diesel marine fuel oil. Defense Fuel Supply Center, Alexandria, Va.

—**Aluminum Co. of America**, Pittsburgh, Pa. $1,378,872. 4,178,000 lbs. of aluminum powder. Defense General Supply Center, Richmond, Va.

—**Booth Packing Co.**, Modesto, Calif. $1,179,264. Assembly of 1,577,417 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa.

—**Southern Packing & Storage Co.** $1,156,586. 1,657,000 cases of combat meals. Defense Personnel Support Center, Philadelphia, Pa.

26—**General Electric**, Owensboro, Ky. $1,055,826. Electron tubes. Defense Electronic Supply Center, Dayton, Ohio.

—**Shell Oil Co.**, New York, N.Y. $3,124,125. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

—**Armour Oil Co.**, San Diego, Calif. $1,279,823. Fuel oil and gasoline. Defense Fuel Supply Center, Alexandria, Va.

27—**Cavalier Bag Co.**, Lumberton, N.C. $4,715,332. 24,000,000 sandbags. Defense General Supply Center, Richmond, Va.

—**Dowling Bag Co.**, Valdosta, Ga. $3,702,641. 18,000,200 sandbags. Defense General Supply Center, Richmond, Va.

—**Consolibag, Inc.**, Philadelphia, Pa. $2,693,113. 13,200,100 sandbags. Defense General Supply Center, Richmond, Va.

—**Pioneer Bag. Co.**, North Kansas City, Mo. $1,974,678. 9,599,800 sandbags. Defense General Supply Center, Richmond, Va.

—**Delta Petroleum Co.**, New Orleans, La. $1,740,485. 3,557,290 gallons of lubricating oil. Defense Fuel Supply Center, Alexandria, Va.

28—**Genesco, Inc.**, Nashville, Tenn. $1,927,240. 212,000 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Endicott-Johnson Corp.**, Endicott, N.Y. $1,493,375. 162,500 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Randolph Mfg. Co.**, Randolph, Mass. $2,406,436. 259,594 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Bata Shoe Co.**, Belcamp, Md. $12,534,754. 1,434,094 pairs of tropical combat boots. Defense Personnel Support Center, Philadelphia, Pa.

—**Albert Turner & Co.**, New York, N.Y. $2,756,400. 120,000 men's polyester wool/tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Robert Hall Clothes**, Brooklyn, N.Y. $1,641,750. 75,000 men's polyester/wool tropical coats. Defense Personnel Support Center, Philadelphia, Pa.

—**Waterbury Button Co.**, Waterbury, Conn. $1,957,909. 20,902,032 gold-plated insignia buttons. Defense Personnel Support Center, Philadelphia, Pa.

—**International Harvester Co.**, Melrose Park, Ill. $1,630,731. Diesel engine tractors, spare parts and service. Defense Construction Supply Center, Columbus, Ohio.

29—**Alpha Industries**, Knoxville, Tenn. $1,380,618. 195,555 men's nylon and cotton sateen field coats with hoods. Defense Personnel Support Center, Philadelphia, Pa.

—**Cleveland Woolens**, Cleveland, Tenn. $1,120,599. 300,000 yards of wool cloth. Defense Personnel Support Center, Philadelphia, Pa.

30—**Endicott-Johnson**, Endicott, N.Y. $3,146,458. 460,596 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**International Shoe Co.**, St. Louis, Mo. $2,070,000. 300,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Sportwelt Shoe Co.**, Nashua, N.H. $2,047,202. 300,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

—**Genesco, Inc.**, Nashville, Tenn. $1,374,999. 200,000 pairs of men's oxford dress shoes. Defense Personnel Support Center, Philadelphia, Pa.

ARMY

1—**FMC Corp.**, San Jose, Calif. $2,033,710. 105mm projectiles. Santa Clara, Calif. Picatinny Arsenal, Dover, N.J.

—**Lockheed Aircraft**, Sunnyvale, Calif. $1,235,791. Equipment and services in connection with underground testing at the Nevada Test Site. Defense Atomic Support Agency, Washington, D.C.

—**Valley Construction Co.**, Columbus, Miss. $1,081,172. Construction of an ammunition facility at Anniston Army Depot, Ala. Engineer Dist., Mobile, Ala.

—**Standard Products**, Cleveland, Ohio. $3,233,808. Rubber track shoe assemblies for M13 personnel carriers. Tank Automotive Command, Warren, Mich.

—**AVCO Corp.**, Stratford, Conn. $4,672,800. P55–L–11 engines for medium transport helicopters. $4,025,000. Special tooling to support production of T55–L–11 engines. Aviation Materiel Command, St. Louis, Mo.

—**Southern Airways of Tex.**, Fort Wolters, Tex. $23,041,998. Helicopter pilot training and maintenance of aircraft and related equipment. Purchasing and Contracting Office, Fort Wolters, Tex.

—**Imodco, Inc.**, Los Angeles, Calif. $1,268,371. Furnishing and installing a floating oil terminal. Engineer Dist., San Francisco, Calif.

2—**United Aircraft**, East Hartford, Conn. $7,020,000. T73–P–1 engines for CH–54A helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Boeing Co.**, Morton, Pa. $9,607,000. Blade assemblies for CH–47 helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Bell Helicopter Co.**, Fort Worth, Tex. $33,076,348. AH–1G helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Lockheed Aircraft**, Sunnyvale, Calif. $1,304,203. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Seattle, Wash., Sunnyvale, Calif., and the Nevada Test Site. Defense Atomic Support Agency.

—**General Electric**, Syracuse, N.Y. $2,635,000. Van-mounted digital computer for use in automating data collection and data reduction in support of war games field experimentation. Electronics Command, Fort Monmouth, N.J.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company — Value — Material or Work to be Performed—Location of Work Performed (if other than company plant) — Contracting agency.

5—**Lockheed Aircraft**, Sunnyvale, Calif. $1,275,230. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Seattle, Wash., Sunnyvale, Calif., and the Nevada Test Site. Defense Atomic Support Agency.

—**White Motor Corp.**, Lansing, Mich. $9,844,869. 2½-ton trucks. General Purpose Vehicle Project Manager, Warren, Mich.

6—**Standard Container, Inc.**, Montclair, N.J. $1,434,162. Boxes for small caliber ammunition. Homerville, Ga. Frankford Arsenal, Philadelphia, Pa.

—**Lawless & Alford, Inc.**, Austin, Tex. $8,242,389. Construction of seven enlisted men's barracks complexes at Fort Hood, Tex. Engineer Dist., Fort Worth, Tex.

—**Burns, Kirkly & Williams Construction Co.**, Auburn, Ala. $1,250,983. Construction of a five-story, 120-man BOQ at Fort Rucker, Ala. Engineer Dist., Mobile, Ala.

—**Hercules Engines**, Canton, Ohio. $1,297,449. 14-horsepower gasoline engines. Canton. Mobility Command, St. Louis, Mo.

7—**Motor Wheel Corp.**, Lansing, Mich. $1,057,103. Tires for self-propelled artillery guns. Tank Automotive Command, Warren, Mich.

—**Anderson Construction Co.**, Holton, Kan. $1,495,777. Work on the Pine Creek Dam and Reservoir Project. Near Valiant, Okla. Engineer Dist., Tulsa, Okla.

—**United Ammunition Container, Inc.**, Philadelphia, Pa. $1,077,250. Fiber containers for ammunition. Atlanta, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**RABR-KIEF, Inc., and B-E-C-K Constructors**, Seattle, Wash. $1,243,100. Construction of a base chapel, NCO open mess, weather facility, and extension of existing taxiway lighting system at Shemya Air Force Station, Alaska; and for construction of a heated automotive storage building at Adak Air Force Station, Alaska. Engineer Dist., Anchorage, Alaska.

—**King - Paola, Inc.**, Kalispell, Mont. $4,809,287. Work on the Libby Dam, Libby, Mont. Engineer Dist., Seattle, Wash.

—**Chrysler Corp.**, Center Line, Mich. $4,639,454. Engineering services in support of heavy tracked combat vehicles. Tank Automotive Command, Warren, Mich.

—**Zenith Radio Corp.**, Chicago, Ill. $1,253,385. Fuzes for 2.75-inch rockets. Harry Diamond Laboratories, Washington, D.C.

—**Mason & Hanger—Silas Mason & Co.**, Lexington, Ky. $2,788,724. Loading, assembling and packing of miscellaneous medium-caliber ammunition and components. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

8—**Link Belt Speeder Co.**, Cedar Rapids, Iowa $1,478,805. 122 self-powered diesel hammers (8,000-lb. capacity) and 14 self-powered diesel hammers (18,000-lb. capacity). Mobility Equipment Command, St. Louis, Mo.

—**Sargent-Fletcher Co.**, El Monte, Calif. $1,716,965. Spray tanks. Edgewood Arsenal, Md.

—**Eureka Williams Co.**, Bloomington, Ill. $1,513,365. Metal parts for 750-lb. bombs. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Garsite Products**, Deer Park, N.Y. $1,030,110. Miscellaneous components for bridges. Mobility Equipment Command, St. Louis, Mo.

9—**Atlas Chemical Industries**, Wilmington, Del. $6,235,850. TNT. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Indianapolis, Ind. $1,622,180. Transmission assemblies for rebuilt M48 and M60 tanks. Indianapolis. Tank Automotive Command, Warren, Mich.

—**Braund, Inc.**, Anchorage, Alaska. $3,516,256. Construction work at Clear Air Force Station, Alaska. Engineer Dist., Anchorage, Alaska.

—**Infrared Industries**, Carpinteria, Calif. $1,629,230. Telescopes for sighting units in M102-towed howitzers. Frankford Arsenal, Philadelphia, Pa.

—**Atlantic Research Corp.**, Alexandria, Va. $3,669,000. Mines. West Hanover, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

12—**Continental Motors**, Muskegon, Mich. $2,925,674. Engine cylinder assemblies for M60 tanks. Tank Automotive Command, Warren, Mich.

—**Mason & Hanger, Silas Mason & Co.**, Lexington, Ky. $4,240,398. 500-lb. bombs. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet Ill.

—**Harvey Aluminum Sales**, Torrance, Calif. $5,424,171. Classified ammunition items. Milan, Tenn. Ammunition Procurement & Supply Agency, Joliet Ill.

—**General Motors**, Detroit, Mich. $1,592,557. Diesel engines, with containers, for 175mm self-propelled guns; eight-inch self-propelled howitzers; and recovery vehicles. Tank Automotive Command, Warren, Mich.

—**Whirlpool Corp.**, Evansville, Ind. $2,059,693. 105mm projectiles. Picatinny Arsenal, Dover, N.J.

—**Polan Industries**, Huntington, W. Va. $1,072,156. Truck-mounted mine detecting sets. Mobility Equipment Command, St. Louis, Mo.

—**Collins Radio Co.**, Dallas, Tex. $1,899,765. Modification kits to expand the capability of tactical radio communications sets. Electronic Command, Philadelphia, Pa.

—**General Electric**, Burlington, Vt. $3,750,894. Self-propelled, anti-aircraft artillery weapons systems. Army Weapons Command, Rock Island, Ill.

13—**System Development Corp.**, Santa Monica, Calif. $2,835,350. Advanced development on a prototype data management system. Defense Supply Service, Washington, D.C.

—**Theisen Bros., Inc.**, Osmond, Neb. $1,502,584. Work on the Local Flood Protection Project, Norfolk, Neb. Engineer, Dist., Omaha, Neb.

—**Thermal Construction Corp.**, Wood-Ridge, N.J. $14,227,000. Construction of 10 barracks complexes to house 3,260 enlisted men. Fort Dix, N.J. Engineer Dist., New York, N.Y.

—**Algernon Blair, Inc.**, Montgomery, Ala. $11,624,000. Construction of 10 barracks complexes. Fort Jackson, S.C. Engineer Dist., Savannah, Ga.

—**General Electric**, Burlington, Vt. $4,727,358. 7.62mm aircraft machine guns, support equipment and spare parts. Army Weapons Command, Rock Island, Ill.

14—**General Time Corp.**, La Salle, Ill. $5,664,316. Time fuzes for 4.2-inch motars and 105mm illuminating shells. Peru, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y. $4,678,929. Manufacturing, loading, assembling and packing of miscellaneous ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Day & Zimmerman, Inc.**, Philadelphia, Pa. $3,865,225. Loading, assembling and packing of miscellaneous components for medium caliber ammunition. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Kisco Co.**, St. Louis Mo. $2,049,494. 105mm cartridge cases. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Mfg. Corp.**, Waterloo, Iowa. $12,407,100. 105mm cartridge cases. Burlington, N.J. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**FMC Corp.**, Charleston, W. Va., $3,700,000. Retrofit and reinspection of armored recovery vehicles (M578). Tank Automotive Command, Warren, Mich.

—**Dixie Contractors, Inc.**, Memphis, Tenn. $2,032,334. Work on Lock and Dam No. 17 of the Arkansas River and Tributaries Project. Wagoner County, Okla. Engineer Dist., Tulsa, Okla.

—**Green Construction Co. and Winston Bros. Co.**, Des Moines, Iowa. $8,817,939. Work on the Beltzville Dam and Reservoir Project, Lehighton, Pa. Engineer Dist., Philadelphia, Pa.

—**Continental Motors**, Muskegon, Mich. $10,313,235. Engine assemblies for 5-ton trucks. Tank Automotive Command, Warren, Mich.

—**Bowen-McLaughlin-York**, York, Pa. $3,221,156. Retrofit of M48A3 tanks. Army Weapons Command, Rock Island, Ill.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $43,734,654. 5-ton trucks. General Purpose Vehicles Project Manager, Warren, Mich.

—**United Aircraft**, Stratford, Conn. $3,712,789. Rotary wings and transmission assemblies for CH-54A helicopters. Aviation Materiel Command, St. Louis, Mo.

—**A. S. Schulman Electric Co.**, Los Angeles, Calif. $3,106,651. Work on the Lower Monumental lock and dam project. Near Pasco, Wash. Engineer Dist., Seattle, Wash.

15—**Continental Motors**, Muskegon, Mich. $1,979,275. Military standard engines. Milwaukee, Wis. Mobility Command, St. Louis, Mo.

—**Martin Marietta**, Orlando, Fla. $5,818,578. Shillelagh missiles. Orlando. Army Missile Command, Huntsville, Ala.

—**Uneco, Inc.**, Bellevue, Neb. $1,768,469. Delay plunger, M1 for the M48A3 fuze. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Southwest Truck Body Co.**, St. Louis, Mo. $3,467,800. XM750 semi-trailer, repair parts storage van 6-ton, 2 wheel. West Plains, Mo. Tank Automotive Command, Warren, Mich.

—**Heil, Co.**, Milwaukee, Wis. $1,458,222. M131A5D semi-trailer, tank, aircraft fuel servicing. Tank Automotive Command, Warren, Mich.

—**Canadian Commercial Corp.**, Ottawa, Canada. $2,266,046. Aircraft engines. Longueuil, Quebec, Canada. Aviation Materiel Command, St. Louis, Mo.

—**M. Sloane Mfg. Co.**, Chelsea, Mass. $1,117,200. Cotton cleaning-swab packs. Procurement Detachment, Chicago, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $1,893,234. Cartridges, 38. cal., special ball, M41. Frankford Arsenal, Philadelphia, Pa.

16—**Collins Radio Co.**, Richardson, Tex. $2,200,000. Modification kits for radio terminal sets. Procurement Detachment, Chicago, Ill.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,634,400. Track shoes assemblies for M48 and M60 tanks. Noblesville, Ind. Tank Automotive Command, Warren, Mich.

—**Honeywell, Inc.**, Hopkins, Minn. $1,262,089. Bomb dispensers. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Arnold M. Diamond, Inc.**, Great Neck, N.Y. $1,081,466. Construction of a central heating and refrigeration plant at Fort Jackson, S.C. Engineer Dist., Savannah, Ga.

—**Valley Construction Co.**, Columbus, Miss. $1,206,188. Construction of an addition to an existing boiler plant, construction of two enlisted men's barracks and one enlisted men's mess at Fort Campbell, Ky. Engineer Dist., Mobile Ala.

—**Ashbach Construction Co.**, St. Paul, Minn. $3,184,858. Flood protection work on the White Clay Creek Project. Atchison, Kan. Engineer Dist., Kansas City, Kan.

—**Highland Industries**, Kansas City, Mo. $3,383,072. Truck-mounted liquid dispensing units. Mobility Equipment Command, St. Louis, Mo.

19—**Dynamics Corp. of America**, Bridgeport, Conn. $1.202,775. 60-cycle generator sets. Mobility Equipment Command, St. Louis, Mo.

—**Chrysler Corp.**, Highland Park, Mich. $8,351,616. Fork lift trucks. Warren, Mich. Mobility Equipment Command, St. Louis, Mo.

—**Anthony Co.**, Streator, Ill. $4,249.872. Fork lift trucks. Mobility Equipment Command, St. Louis, Mo.

—**Sperry Rand Corp.**, Salt Lake City, Utah. $1,100,000. FY 1968 engineering services for the Sergeant missile system. Army Missile Command, Huntsville, Ala.

—**Lear Siegler, Inc.**, South Gate, Calif. $1,887,038. Shipping and storage containers for 20mm cartridges. Frankford Arsenal, Philadelphia, Pa.

—**General Electric**, Burlington, Vt. $3,201,982. $2,937,600. 7.62mm aircraft machine guns, armament pods and related equipment. Army Weapons Command, Rock Island, Ill.

—**MacLeod Co.**, Cincinnati, Ohio. $1,082,904. Truck-mounted water distributor tanks. Mobility Equipment Command, St. Louis, Mo.

—**Gibbs Mfg. & Research Corp.**, Janesville, Wis. $1,047,797. Metal parts for 2.75-inch rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**LTV Aerospace Corp.**, Warren, Mich. $11,973,198. Ground support equipment for the Lance missile system. Army Missile Command, Warren, Mich.

—**Seaboard Construction Co.**, Brunswick, Ga. $1,717,069. Construction of an airfield facility, POL facilities and a prefabricated sewage treatment plant at Fort Stewart, Ga. Engineer Dist., Savannah, Ga.

20—**Bell Aerospace Corp.**, Fort Worth, Tex. $4,990,350. UH-1D helicopters. Aviation Materiel Command, St. Louis, Mo.

—**General Motors**, Detroit, Mich. $2,284,703. Diesel engines for M113 vehicles. Tank Automotive Command, Warren, Mich.

—**General Motors**, Cleveland, Ohio. $19,212,760. 155mm self-propelled howitzers. Army Weapons Command, Rock Island, Ill.

—**Henry A. Knott, Inc.**, Baltimore, Md. $2,290,900. Construction of a one-story laboratory building and a one-story toxic storage building at Edgewood Arsenal, Md. Engineer Dist., Baltimore, Md.

—**Norris Industries, Inc.**, Everett, Mass. $2,515,238. 66mm rocket launchers (M72). Ammunition Procurement & Supply Agency, Joliet, Ill.

21—**Forsberg & Gregory**, Redlands, Calif. $2,149,643. Construction of five 3-story barracks buildings and alterations to the base operations maintenance dock and hanger facilities at Norton AFB, Calif. Engineer Dist., Los Angeles, Calif.

—**Craig Systems Corp.**, Lawrence, Mass. $1,364,406. Shelters for electrical equipment. Lawrence. Electronics Command, Philadelphia, Pa.

—**Ford Motors**, Birmingham, Mich. $7,707,171. ¼-ton utility trucks. Highland Park, Mich. General Purpose Vehicle Project Manager, Warren, Mich.

—**R. C. Can Co.**, Hazelwood, Mo. $1,263,209. Fiber containers for ammunition. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Great Lakes Dredge & Dock Co.**, Cleveland, Ohio. $1,786,116. Work on the Ashtabula, Ohio, Harbor Project. Engineer Dist., Buffalo, N.Y.

—**Strick Corp.**, Fairless Hills, Pa. $11,634,148. 12-ton stake semi-trailers. Chicago, Ill. Tank Automotive Command, Warren, Mich.

22—**Canadian Commercial Corp.**, Ottawa, Canada. $3,156,900. Production of TNT. Beloiel, Quebec. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Pace Corp.**, Memphis, Tenn. $6,251,653. Ground illuminating signals and parachute illuminating signals. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hayes International Corp.**, Birmingham, Ala. $1,588,000. Metal parts for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Bell Helicopter Co.**, Fort Worth, Tex. $8,941,076. TH-13T helicopter basic instrument trainers and related data. Aviation Materiel Command, St. Louis, Mo.

—**AVCO Corp.**, Stratford, Conn. $1,646,390. 1967 production improvement program for T-55 engines. Aviation Materiel Command, St. Louis, Mo.

—**Servo Corp. of America**, Hicksville, N.Y. $2,811,793. Receiving sets. Electronics Command, Philadelphia, Pa.

—**Raytheon Co.**, Burlington, Mass. $1,020,019. Repair part kits for communication facilities. Hawthorne, Calif. Electronics Command, Philadelphia, Pa.

—**Western Electric**, New York, N.Y. $4,219,500. Overhaul of three Nike Hercules systems. Burlington, N.C. Army Missile Command, Huntsville, Ala.

—**J. W. Bateson Co.**, Dallas, Tex. $7,846,697. Construction of eight classroom buildings and support utilities at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.

23—**Joseph L. Pohl Contractor**, Nevada, Mo. $1,389,831. Work on the Stockton, Mo., Dam and Reservoir. Engineer Dist., Kansas City, Mo.

—**National Presto, Inc.**, Eau Claire, Wis. $12,350,947. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**National Union Electric, Corp.**, Bloomington, Ill. $2,008,515. Bomb fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Northrop Caroline, Inc.**, Asheville, N. C. $1,302,000. Chemicals. Swannanoa, N.C. Edgewood Arsenal, Md.

—**Lockheed Electronics Co.**, Plainfield, N.J. $2,160,000. Radar sets. Metuchen, N.J. Frankford Arsenal, Philadelphia, Pa.

—**SCM Corp.**, Deerfield, Ill. $2,301,268. Teletypewriter sets. Electronics Command, Philadelphia, Pa.

—**IBM Corp.**, El Paso, Tex. $1,358,102. Automatic data processing equipment. White Sands Missile Range, N.M. Electronics Command, Philadelphia, Pa.

—**Raytheon Co.**, Norwood, Mass. $1,581,181. Telephone signal equipment. Electronics Command, Philadelphia, Pa.

—**FMC Corp.**, Charleston, W. Va. $12,237,400. M113 armored personnel carriers, mortar carriers, command post carriers, control test items and repair items. Tank Automotive Command, Warren, Mich.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $1,571,700. OH-13S helicopters. Aviation Materiel Command, St. Louis, Mo.

—**Chrysler Corp.**, Highland Park, Mich. $2,025,174. Cupola modification kits and cupola adapter vision ring kits. Scranton, Pa. and Warren, Mich. Army Weapons Command, Rock Island, Ill.

—**Hughes Aircraft**, Fullerton, Calif. $2,139,167. Radio sets, receiver, transmitters and spare parts. Southwest Procurement Detachment, Pasadena, Calif.

—**Allison Steel Mfg. Co.**, Phoenix, Ariz. $3,270,072. Saddle assemblies. Mobility Equipment Command, St. Louis, Mo.

—**Arvol D. Hays Construction Co.**, Lubbock, Tex $1,615,630. Construction of on-base facilities for expanded aviation training at Fort Wolters, Tex. Engineer Dist., Fort Worth, Tex.

—**R. A. Heintz Construction Co., and Willamette Western Corp.**, Portland, Ore. $8,664,974. Work on the Libby, Mont., Dam Project. Engineer Dist., Seattle, Wash.

—**Wilkenson Mfg. Co.**, Fort Calhoun, Neb. $1,140,750. Fin assemblies for 60mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**E. G&G, Inc.**, Albuquerque, N.M. $1,500,000. Equipment and services in connection with underground nuclear testing at the Nevada Test Site. Defense Atomic Support Agency, Washington, D.C.

—**Case-Master Body, Inc.**, Rose City, Mich. $6,864,633. Two-wheel water tank trailers. Tank Automotive Command, Warren, Mich.

—**Ross Aviation, Inc.**, Tulsa, Okla. $4,032,847. Fixed-wing, primary and instrument training, and rotary-wing basic instrument flight training. Fort Rucker, Ala. and Fort Stewart, Ga. Purchasing & Contracting Office, Fort Rucker, Ala.

26—**Hercules, Inc.**, Wilmington, Del. $10,221,181. Rocket propellant and operation and maintenance activities. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Electric**, Burlington, Vt. $13,639,900. XM163 weapons systems. Army Weapons Command, Rock Island, Ill.

—**Fairchild Camera & Instrument Co.**, Syosset, N.Y. $6,086,500. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.

—**Texas Instrument Co.**, Dallas, Tex. $6,100,600. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.

—**Raytheon Co.**, Bristol, Tenn. $6,100,600. M514A1 artillery fuzes. Harry Diamond Laboratories, Washington, D.C.

—**Engelhard Hanovia, Inc.**, Newark, N.J. $1,782,144. Lamp assemblies for Xenon searchlights. Electronics Command, Fort Monmouth, N.J.

—**Honeywell, Inc.**, Tampa, Fla. $10,000,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—**General Electric**, Red Bank, N.J. $1,074,558. Tool and test equipment and ancillary items for attitude heading reference sets. West Lynn, Mass. Electronics Command, Fort Monmouth, N.J.

—**Rodgers Hydraulic, Inc.**, Minneapolis, Minn. $1,139,000. Various hydraulic presses. Granite Falls, Minn. Mobility Equipment Command, St. Louis, Mo.

—**Elliott Machine Works**, Phoenix, Ariz. $1,712,910. Trailer-mounted lubricating and servicing units. Galion, Ohio and Phoenix. Mobility Equipment Command, St. Louis, Mo.

—**Stanford Research Institute**, Menlo Park, Calif. $1,092,000. Classified work. Army Research Office, Durham, N.C.

—**Aerojet General**, Sacramento, Calif. $1,287,900. XM22E8 Hawk rocket motors. Northwest Procurement Agency, Oakland, Calif.

—**Ampex Corp.**, Redwood City, Calif. $1,357,430. Educational TV technical terminal facilities, programs and control tests for 12 US CONARC Training Centers. Purchasing and Contracting Office, Fort Monroe, Va.

27—**Sperry Rand Corp.**, Phoenix, Ariz. $3,088,800. Gyromagnetic compass sets and ancillary items. Electronics Command, Fort Monmouth, N.J.

—**Varo, Inc.**, Garland, Tex. $1,485,107. Night vision weapons. Electronics Command, Fort Monmouth, N.J.

—**M.I.T.**, Cambridge, Mass. $1,275,000. Basic applied research work in the fields of general physics, plasma dynamics, communication sciences and engineering. Electronics Command, Fort Monmouth. N.J.

—**Raytheon, Co.**, Norwood, Mass. $2,569,400. Multiplexers (telephone or telegraph terminals housed in shelters). North Dighton, Mass. Electronics Command, Fort Monmouth, N.J.

—**Collins Radio, Co.**, Dallas, Tex. $3,750,000. Radio terminal sets and regular part kits. Electronics Command, Philadelphia, Pa.

—**General Dynamics**, Pomona, Calif. $1,784,064. Engineering services for the Redeye missile. Army Missile Command, Huntsville, Ala.

—**Oberg Construction Co.**, Northridge, Calif. $2,124,000. Construction of a steel hanger with concrete lean-to and a small concrete apron at Edwards AFB, Calif. Engineer Dist., Los Angeles, Calif.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $30,429,269. 1¼-ton cargo trucks and ambulances. General Purpose Vehicles Project Manager, Warren, Mich.

—**D & A Equipment Co.**, Pensacola, Fla. $1,591,548. Construction of a two-story office building, aircraft maintenance facilities, a flammable storage and paint shop, a boiler plant, and supporting utilities at Fort Rucker, Ala. Engineer Dist., Mobile, Ala.

—**Peter Kiewit Sons' Co.**, Vancouver, Wash. $1,033,207. Grading work in the Union Railroad Company area near Arlington, Ore. (part of John Day Lock and Dam Project). Engineer Dist., Walla Walla, Wash.

—**Westinghouse Electric**, Washington, D.C. $1,120,193. Design, fabrication and testing of 30 KW generator sets. Buffalo, N.Y. Engineer Research Laboratory, Fort Belvoir, Va.

—**Stewart & Stevenson Services**, Houston, Tex. $1,552,610. 45 KW multi-purpose generator sets. Mobility Equipment Command, St. Louis, Mo.

—**Gichner Mobile Systems, Inc.**, Berkley Springs, W. Va. $1,498,948. Airmobile transporters. Aviation Materiel Command, St. Louis, Mo.

28—**DeLong Corp.**, New York, N.Y. $3,200,000. Work on the Vung Ao and Vung Tau pier installations in Vietnam. Mobility Equipment Command, St. Louis, Mo.

—**Gichner Mobile Systems**, Berkley Springs, W. Va. $1,468,176. Portable, electric, tool outfits. Mobility Equipment Command, St. Louis, Mo.

—**John R. Hollingsworth Co.**, Phoenixville, Pa. $1,148,343. 7½ KW generator sets. Mobility Equipment Command, St. Louis, Mo.

—**American Pipe & Construction Co.**, Monterey Park, Calif. $2,209,387. Concrete pressure water pipe with fittings. Okinawa. Engineer Dist., Okinawa.

—**Chamberlain Mfg. Corp.**, Waterloo, Iowa, $1,265,336. Metal parts for the 2.75-inch rocket. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Collins Radio Co.**, Richardson, Tex. $2,444,739. Radio sets with repair part kits. Procurement Detachment, Chicago, Ill.

—**Donaldson Co.**, Minneapolis, Minn. $1,628,531. Exploratory and advanced development services to establish modularized collective protection for vehicles, vans and shelters. Edgewood Arsenal, Md.

—**Raytheon Co.**, Lexington, Mass. $7,360,376. Initial production run of the self-propelled Hawk missile ground support equipment. Andover, Mass. and Bristol, Tenn. Army Missile Command, Huntsville, Ala.

—**Raytheon Co.**, Lexington, Mass. $1,044,400. Production assurance engineering services for the Hawk missile system. Andover, Mass. Army Missile Command, Huntsville, Ala.

—**Northrop Corp.**, Newbury Park, Calif. $1,557,400. Target missile flight services for Project Charging Sparrow. Clark Field, Philippines. Army Missile Command, Huntsville, Ala.

—**General Electric**, Syracuse, N.Y. $6,158,810. Modification kits for high power acquisition radar and rotary joints used in connection with anti-jamming improvement on the Nike-Hercules system. Army Missile Command, Huntsville, Ala.

—**General Electric**, Springfield, Mass. $1,900,000. Production and furnishing of 7.62mm machine guns. Army Weapons Command, Rock Island, Ill.

—**Global Associates**, Oakland, Calif. $3,759,386. Logistics support at the Kwajalein Test Site, Marshall Islands. Nike X Project Office, Huntsville, Ala.

—**Hughes Tool Co.**, Culver City, Calif. $13,644,312. Model TH55A primary trainer helicopters and related data. San Diego, Calif. Aviation Materiel Command, St. Louis, Mo.

—**Continental Motors**, Muskegon, Mich. $3,196,344. Production and ship equipment for the LDS series of engines for 2½-ton and 5-ton trucks, and M48 and M60 tanks. Tank Automotive Command, Warren, Mich.

—**Southwest Truck Body Co.**, St. Louis, Mo. $1,298,150. M447 semi-trailers and M295A1 semi-trailer chassis. West Plains, Mo. Tank Automotive Command, Warren, Mich.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $3,150,073. Spare parts for trucks. Tank Automotive Command, Warren, Mich.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $5,754,175. M715 and M725 1¼-ton vehicles. General Purpose Vehicles Project Manager, Warren, Mich.

—**Kaiser Jeep Corp.**, Toledo, Ohio. $1,457,486. M606 ¼-ton utility trucks. Tank Automotive Command, Warren, Mich.

—**McCarthy Bros. Construction Co.**, St. Louis, Mo. $1,486,366. Work on the St. Louis Flood Protection Project. Engineer Dist., St. Louis, Mo.

—**M.M. Sundt**, Tuscon, Ariz. $1,387,450. Construction of a one-story addition for 20 beds plus alterations to an existing hospital at Davis Monthan AFB, Ariz. Engineer Dist., Los Angeles, Calif.

—**Missouri Research Labs**, St. Chalres, Mo. $1,082,909. Air mobile shelters. Aviation Materiel Command, St. Louis, Mo.

—**Photo-Sonics, Inc.**, Burbank, Calif. $1,443,830. Versatile tracking mounts with binocular scopes. White Sands Missile Range, N.M.

—**Northrop Corp.**, Anaheim, Calif. $1,142,801. 106mm projectiles. Picatinny Arsenal, Dover, N.J.

—**Varian Associates**, Beverly, Mass. $1,592,120. Electron tubes for radar sets. Electronics Command, Philadelphia, Pa.

—**VIZ Mfg. Co.**, Philadelphia, Pa. $1,868,465. Radiosonde sets. Electronics Command, Philadelphia, Pa.

—**Western Electric**, New York, N.Y. $2,362,479. Additional Nike X planning effort. Burlington, N.C. and Allentown, Pa. Nike X Project Office, Huntsville, Ala.

29—**Mack Truck, Inc.**, Allentown, Pa. $1,305,302. Transmission assemblies for 10-ton trucks. Hagerstown, Md. Tank Automotive Command, Warren, Mich.

—**Mack Truck, Inc.**, Allentown, Pa. $4,884,316. Axle assemblies for 10-ton trucks. Tank Automotive Command, Warren, Mich.

—**Cummins Engine Co.** $3,890,621. Diesel engines with accessories for 10-ton trucks. Tank Automotive Command, Warren, Mich.

—**Consolidated Diesel Electric Co.**, Old Greenwich, Conn. $19,115,838. Ten-ton trucks. Old Greenwich, Conn; Scotia, N.Y.; Schenectady, N.Y.; and Toms River, N.J. Tank Automotive Command, Warren, Mich.

—**Chrysler Motors**, Warren, Mich. $3,556,078. One-ton cargo trucks and one-ton ambulances. Tank Automotive Command, Warren, Mich.

—**White Motors**, Lansing, Mich. $1,171,000. Production engineering for 2½-ton M44 and M600 trucks. Tank Automotive Command, Warren, Mich.

—**Continental Aviation & Engineering Corp.**, Detroit, Mich. $2,339,400. Production engineering and inspection engineering for 2½- and 5-ton truck engines. Tank Automotive Command, Warren, Mich.

—**International Harvestor Co.**, Chicago, Ill. $2,313,871. Trucks. Bridgeport, Conn. Tank Automotive Command, Warren, Mich.

—**Ford Motors**, Dearborn, Mich. $1,638,600. Production engineering services for M151-A1 and M718 trucks. Tank Automotive Command, Warren, Mich.

—**Bowen-McLaughlin-York**, York, Pa. $1,260,007. XM501E3 guided missile loaders and transporters. Bair, Pa. Tank Automotive Command, Warren, Mich.

—**Aerojet General**, Downey, Calif. $1,548,624. Bomb dispensers. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Norris Industries**, Los Angeles, Calif. $2,255,230. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Atlantic Research Corp.**, Alexandria, Va. $3,740,000. Classified munitions. West Hanover, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Atlantic Research Corp.**, Alexandria, Va. $8,750,000. Classified munitions. Hingham, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $1,283,000. Reactivation, repair, and utilities in support of 105mm, M1 projectile metal parts. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Corp.**, Waterloo, Iowa. $6,703,060. Metal parts for 175mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York, N.Y. $2,759,585. Various explosives and reactivation of loading, assembling and packing units. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $6,651,199. Small arms propellant. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Appalachian Power Co.**, New York, N.Y. $2,900,000. Electrical power at the Army Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Bedford, Mass. $2,900,000. Advanced development of SAM-D. Army Missile Command, Huntsville, Ala.

—**Raytheon Co.**, Lexington, Mass. $3,750,839. Installation of modification kits for the Hawk missile system. Army Missile Command, Huntsville, Ala.

—**Raytheon Co.**, Andover, Mass. $6,947,759. Line items of ground support equipment and field maintenance equipment for the Hawk missile system. Andover, Mass. and Waltham, Mass. Army Missile Command, Huntsville, Ala.

—**Hol-Gar Mfg. Co.**, Primos, Pa. $1,967,366. 1.5KW generator sets. Mobility Equipment Command, St. Louis, Mo.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,066,130. Petroleum tanks. Magnolia, Ark. Mobility Equipment Command, St. Louis, Mo.

—**Uniroyal**, Mishawaka, Wis. $1,097,540. Petroleum tanks. Warsaw, Ind. Mobility Equipment Command, St. Louis, Mo.

—**General Motors**, Kokomo, Ind. $1,997,147. Radio transmitters and receivers. Electronics Command, Philadelphia, Pa.

—**Memcor, Inc.**, Huntington, Ind. $3,123,108. Radio receivers and receiver/transmitters. Electronics Command, Philadelphia, Pa.

—**Mine Safety Appliance Co.**, Pittsburgh, Pa. $2,241,700. Field protective masks. Esmond, R.I. Edgewood Arsenal, Md.

—**Honeywell, Inc.**, Tampa, Fla. $1,500,000. Classified research and development. Electronics Command, Fort Monmouth, N.J.

—**Chicago Aerial Industries, Inc.**, Barrington, Ill. $2,156,000. Cameras, camera components and equipment. Electronics Command, Fort Monmouth, N.J.

—**Caterpillar Tractor Co.**, Peoria, Ill. $2,183,606. Tractors. Kansas City, Mo. Engineer Research and Development Laboratories, Fort Belvoir, Va.

—**H. Halvorson, Inc.**, Spokane, Wash. $1,339,500. Construction of a Federal Regional Center. Bothell, Wash. Engineer Dist., Seattle, Wash.

—**Hawthorne Aviation**, Fort Rucker, Ala. $2,175,201. Aircraft maintenance services and related test support of the Army Aviation Test Board. Aberdeen Proving Grounds, Md.

—**Maremont Corp.**, Saco, Maine. $2,580,252. Barrel assemblies for 7.62mm machine guns. Procurement Detachment, New York, N.Y.

—**M.M. Sundt Corp.**, Tuscon, Ariz. $1,072,479. Construction of an Aerobee 350 launch facility at White Sands Missile Range, N.M. Engineer Dist., Albuquerque, N.M.

—**Potashmick Dredging, Inc.**, Fort Lauderdale, Fla. $2,616,190. Work on the Savannah, Ga., Harbor Project. Engineer Dist., Savannah, Ga.

—**Bermite Powder Co.**, Saugus, Calif. $1,914,655. Various fuzes. Harry Diamond Laboratory, Washington, D.C.

—**Philco Ford Corp.**, Newport Beach, Calif. $2,558,335. 40mm grenade launchers. Anaheim, Calif. Southwest Procurement Agency, Pasadena, Calif.

—**Aerojet General**, Azusa, Calif. $1,173,900. Design and fabrication of forward looking infrared airborne target acquisition and fire control system. Frankford Arsenal, Philadelphia, Pa.

—**Great Lakes Dredging & Dock Co.**, New York, N.Y. $14,280,000. Work on the Providence River and Harbor, R.I. New England Div., Corps of Engineers, Waltham, Mass.

—**Bethlehem Steel Corp.**, Bethlehem, Pa. $1,779,649. Forgings for 175mm guns. Watervliet Arsenal, N.Y.

—**Thiokol Chemical Corp.**, Brunswick, Ga. $1,002,000. Tear gas. Edgewood Arsenal, Md.

30—**ACF Industries**, St. Louis, Mo. $1,587,134. Fuzes. Olivette, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Aerojet General**, Downey, Calif. $1,831,800. Metal parts for 2.75-inch rockets. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $22,452,920. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Mfg. Co.**, Waterloo, Iowa. $2,972,240. Metal parts for 155mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Mfg. Co.**, Scranton, Pa. $1,515,755. Repairs in support of the 155mm, M107 program; the 155mm, M121A1 program and modernization in support of the 175mm, M437 program. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**E. I. DuPont Nemours & Co.**, Wilmington, Del. $2,726,076. TNT. Barksdale, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $2,476,273. Metal parts for 105mm projectiles. St. Louis, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**National Presto Industries**, Eau Claire, Wis. $11,084,635. Metal parts for 105mm projectiles. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Ingraham Co.**, Bristol, Conn. $1,812,774. Metal parts assembly of M125A1 boosters. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Zenith Radio Corp.**, Chicago, Ill. $1,530,206. Metal parts for rocket fuzes. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Bulova Watch Co.**, Jackson Heights, N.Y. $1,152,804. Metal parts for fuzes and arming mechanisms for fuzes. Valley Steam, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Columbus Mil Par Mfg. Co.**, Columbus, Ohio. $2,810,467. Metal parts for fuzes. Westerville, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $8,637,068. Rocket motors and miscellaneous items. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $3,553,717. Various propellants, artillery and guided missile items. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y., $8,126,630. Loading, assembling and packing medium caliber and large caliber ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, New York, N.Y. $5,348,949. Loading, assembling and packing miscellaneous propellants. Charleston, Ind. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sylvania Electronics Products**, Mountain View, Calif. $1,500,000. Classified electronics equipment. Santa Cruz, Calif. Electronics Command, Fort Monmouth, N.J.

—**Minnesota Mining & Mfg. Co.**, Camarillo, Calif. $2,300,000. Classified electronics equipment. Electronics Command, Fort Monmouth, N.J.

—**Stromberg Carlson Corp.**, Rochester, N.Y. $8,155,781. Fabrication of nine tandum switching centers to be installed at sites in Southeast Asia. Electronics Command, Fort Monmouth, N.J.

—**Sperry Rand Corp.**, Great Neck, N.Y. $1,007,420. Designing and planning for fabrication of an exploratory development model electronic scanning pencil beam antenna and related data items. Electronics Command, Fort Monmouth, N.J.

—**Sperry Rand Corp.**, Phoenix, Ariz. $1,196,969. Automatic flight control systems and electro-mechanic rotary actuators. Electronics Command, Fort Monmouth, N.J.

—**Canadian Commercial**, Ottawa, Canada. $1,443,054. Test facilities and maintenance support kits for radio sets. Montreal, Canada. Electronics Command, Fort Monmouth, N.J.

—**HRB Singer, Inc.**, Morrestown, N.J. $4,055,880. Radio set transmitters, infrared detecting sets and maintenance floats to support the AN/AAS-14. Electronics Command, Fort Monmouth, N.J.

—**R. T. Communications,** Rochester, N.Y. $1,600,000. Transportable radio sets. Electronics Command, Fort Monmouth, N.J.

—**Stelma, Inc.,** Stamford, Conn. $1,275,001. Automated technical control system. Electronics Command, Fort Monmouth, N.J.

—**Collins Radio Co.,** Cedar Rapids, Iowa. $2,012,158. Direction finder sets and major components. Electronics Command, Fort Monmouth, N.J.

—**Machlett Laboratories,** Stamford, Conn. $5,398,043. 25mm image intensifier assemblies. Electronics Command, Fort Monmouth, N.J.

—**VARO, Inc.,** Garland, Tex. $1,639,400. Xenon searchlights. Electronics Command, Fort Monmouth, N.J.

—**Hoffman Electronics Corp.,** El Monte, Calif. $3,500,000. Airborne radio sets. Electronics Command, Fort Monmouth, N.J.

—**Page Communications Engineers, Inc.,** Washington, D.C. $2,000,000. Work on a classified project. Southeast Asia. Electronics Command, Fort Monmouth, N.J.

—**Machlett Laboratories,** Stamford, Conn. $1,657,306. Miniaturized AN/PVS-3 minniscope. Electronics Command, Fort Monmouth, N.J.

—**Continental Motors,** Muskegon, Mich. $2,838,028. $2,180,101. Five-ton truck engines. Tank Automotive Command, Warren, Mich.

—**General Motors,** Indianapolis, Ind. $2,907,926. M109 transmissions and related parts. 1,325,405. Transmissions for the M113A1 family of vehicles. Tank Automotive Command, Warren, Mich.

—**Stevens Mfg. Co.,** Ebensburg, Pa. $2,722,766. 1½-ton cargo trailers. Tank Automotive Command, Warren, Mich.

—**Johnson Corp.,** Bellevue, Ohio. $13,158,694. 1½-ton cargo trailers. Tank Automotive Command, Warren, Mich.

—**Mack Trucks,** Allentown, Pa. $1,388,380. Spare diesel engines for 5-ton trucks. Hagerstown, Md. Tank Automotive Command, Warren, Mich.

—**Continental Motors,** Muskegon, Mich. $2,578,309. $2,694,408. Five-ton truck engines. Tank Automotive Command, Warren, Mich.

—**Case Master Body, Inc.,** Rose City, Mich. $8,520,627. ¾-ton cargo trailers. Holland, Mich. Tank Automotive Command, Warren, Mich.

—**FMC Corp.,** San Jose, Calif. $1,671,305. Metal parts assemblies for XM594E1 projectiles. Santa Clara, Calif. Picatinny Arsenal, Dover, N.J.

—**Whirlpool Corp.,** Evansville, Ind. $1,015,682. 90mm projectiles. $3,822,950. 90mm canister assemblies. Picatinny Arsenal, Dover, N.J.

—**Northrop Corp.,** Anaheim, Calif. $1,150,442. 90mm projectiles. Picatinny Arsenal, Dover, N.J.

—**Norris Industries,** Vernon, Calif. $4,261,530. Metal parts for 152mm projectiles. Picatinny Arsenal, Dover, N.J.

—**Muncie Gear Works,** Muncie, Ind. $1,164,810. Fin and nozzle assemblies for 2.75-inch rockets, Picatinny Arsenal, Dover, N.J.

—**AVCO Corp.,** Stratford, Conn. $1,272,688. Impeller assemblies for T53 engines for VH1 aircraft. Aviation Materiel Command, St. Louis, Mo.

—**Bell Aerospace Corp.,** Fort Worth, Tex. $2,000,000. Revision in the delivery schedule of UH1D helicopters. Aviation Materiel Command, St. Louis, Mo.

—**AVCO Corp.,** Stratford, Conn. $2,919,000. Particle separators for T53 engines. Charleston, S.C. Aviation Materiel Command, St. Louis, Mo.

—**Bell Helicopter Co.,** Fort Worth, Tex. $1,033,858. Adjustment in the work scope on the UH-1 helicopter. Aviation Materiel Command, St. Louis, Mo.

—**Bell Aerospace Corp.,** Fort Worth, Tex. $4,023,800. $2,758,640. Rotar blades for UH-1 helicopters. Aviation Materiel Command, St. Louis, Mo.

—**General Motors,** Cleveland, Ohio. $1,086,309. Vehicle engineering services. Army Weapons Command, Rock Island, Ill.

—**Chrysler Corp.,** Detroit, Mich. $17,385,290. Tanks, combat engineer vehicles and chassis for M60A1 tanks. Dayton, Ohio; Detroit and Centerline, Mich.; Huntsville, Ala.; and Scranton, Pa. Army Weapons Command, Rock Island, Ill.

—**Colt's Inc.,** Hartford, Conn. $4,500,000. License to use technical data and patents pertaining to 5.56mm M16, M16A1, XM177 and XM177E2 rifles. Army Weapons Command, Rock Island, Ill.

—**Martin & Gass, Inc.,** Merryfield, Va. $2,258,342. Demolition and construction necessary to expand burial areas at the National Cemetery, Arlington, Va. Engineer Dist., Norfolk, Va.

—**Oman Construction Co.,** Nashville, Tenn. $1,393,227. Clearing timber and preparing the foundation abutments and portal areas for construction of the Gathright Dam. Covington, Va. Engineer Dist., Norfolk, Va.

—**Williams Paving Co.,** Norfolk, Va. $1,346,619. Clearing timber, and excavation, grading and construction work for the New Market Creek area in Hampton and Newport News, Va. Engineer Dist., Norfolk, Va.

—**Kaiser Jeep Corp.,** Toledo, Ohio. $12,443,028. $12,533,448. Five-ton trucks. South Bend, Ind. General Purpose Vehicle Project Manager, Warren, Mich.

—**Continental Motors,** Muskegon, Mich. $1,507,785. ¼-ton truck engine assemblies. General Purpose Vehicle Project Manager, Warren, Mich.

—**Fairchild Camera & Instrument Corp.,** Syosset, N.Y. $2,015,000. Still picture cameras and test sets. Electronics Command, Philadelphia, Pa.

—**Arvin Industries, Inc.,** Columbus, Ind. $1,469,945. Direction finder sets. Electronics Command, Philadelphia, Pa.

—**Raytheon, Co.,** North Dighton, Mass. $2,360,000. Electronic equipment. Electronics Command, Philadelphia, Pa.

—**URS Corp.,** San Mateo, Calif. $3,721,082. Continued development of an ADP system. Fort Hood, Tex. Engineer Research Laboratories, Fort Belvoir, Va.

—**Battelle Memorial Institute,** Columbus, Ohio. $1,102,900. Work on a classified project. Defense Supply Service.

—**FMC Corp.,** San Jose, Calif. $1,586,740. Support of production for the M113A1, M106A1, M125A1, M177A1, XM741, and all Vulcan Air Defense family of vehicles. Northwest Procurement Agency, Oakland, Calif.

—**Sante Fe Engineers, Inc., and Stolte, Inc., DBA S&S Constructors,** Lancaster, Calif. $2,797,000. Construction of space launch complex #6, packages 3 and 4 (for support facilities), and a fire station, at Vandenburg AFB, Calif. Engineer Dist., Los Angeles, Calif.

—**Page Aircraft Maintenance, Inc.,** Lawton, Okla. $5,871,378. Performance of field and organizational aircraft maintenance on fixed and rotary wing aircraft. Fort Rucker, Ala. and Fort Stewart, Ga. Purchasing and Contracting Office, Fort Rucker, Ala.

—**Federal Laboratories, Inc.,** Saltsburg, Pa. $1,012,680. Hand grenades. Edgewood Arsenal, Md.

—**Greenhut Construction Co.,** Pensacola, Fla. $1,315,547. Construction of a one-story technical library building and a two-story data service facility building with basement at Eglin AFB, Fla. Engineer Dist., Mobile, Ala.

—**Hansel Phelps Construction Co.,** Greeley, Colo. $11,721,000. Construction of 10 enlisted men's barracks complexes at Fort Riley, Kan. Engineer Dist., Kansas City, Mo.

—**Hi-Voltage Engineering Corp.,** Burlington, Mass. $1,782,000. Erection of shielding for tandem Van De Groff accelerators. Edgewood, Md. Edgewood Arsenal, Md.

—**Cessna Aircraft,** Wichita, Kan. $1,433,795. Dispensers for bomblets. Procurement Detachment, Chicago, Ill.

—**Copperweld Steel Co.,** Glassport, Pa. $5,633,280. Manufacturing and furnishing non-corrosive copper coated steel wire fabric for use in production of articulated concrete mattresses for use on the Missisippi River and Tributaries Flood Control Channel Improvement project. Engineer Dist., Memphis, Tenn.

—**S. S. Mullen, Inc., and Dravo Corp.,** Seattle, Wash. $7,084,400. Construction of access and construction facilities for the Snettisham Dam hydropower project in Alaska. Engineer Dist., Anchorage, Alaska.

—**Bushman Construction Co.,** St. Joseph, Mo. $2,229,072. Construction of Phase II of a concrete spillway for the Oologah Dam and Reservoir, Okla. Engineer Dist., Tulsa, Okla.

—**N. R. Hamm Contractor, Inc.,** Perry, Kan. $2,034,433. Flood protection work Section 1. North Lawrence, Kan. Engineer Dist., Kansas City, Mo.

—**Magnavox Co.,** Urbana, Ill. $2,879,609. M18 direction computer guns. Frankford Arsenal, Philadelphia, Pa.

—**General Time Corp.,** Skokie, Ill. $2,916,179. XM711 fuzes. Frankford Arsenal, Philadelphia, Pa.

—**Systems Development Corp.,** Santa Monica, Calif. $1,293,977. A systems training program for the Army Air Defense Missile Mentor and the Birdie Air Defense Control and Coordination System. Army Missile Command, Huntsville, Ala.

—**Northrop, Corp.,** Anaheim, Calif. $2,202,012. Hawk launchers. Army Missile Command, Huntsville, Ala.

—**Wyatt and Kippers Engineers, Inc., and Burgess Construction Co.,** Seattle, Wash. $1,320,121. Construction of a primary power generation at Eielson AFB, Alaska. Engineer Dist., Anchorage, Alaska.

—**J. A. Guy, Inc.,** Dublin, Ohio. $1,779,300. Construction of a toxic laboratory addition and for alterations with appurtenant utilities at Wright-Patterson AFB, Ohio. Engineer Dist., Louisville, Ky.

—**Brown & Root, Inc.,** Houston, Tex. $2,372,413. Construction of the Sabin Lake South spoil disposal area for the Sabin-Neches Waterway. Port Arthur, Tex. Engineer Dist., Galveston, Tex.

—**Automatic Electric Co.,** North Lake, Ill. $1,494,750. Line items of various telephone central office equipment. Electronic Proving Ground, Fort Huachuca, Ariz.

—**Booz-Allen Applied Research,** Chicago, Ill. $1,710,527. Continuation of studies being performed by the Combined Army Research Office. Fort Leavenworth, Kan. Southwest Procurement Agency, Pasadena, Calif.

—**Studebaker Corp.,** Minneapolis, Minn. $2,918,322. Various generator sets. Engineer Research and Development Laboratory, Fort Belvoir, Va.

—**Allis Chalmers Mfg. Co.,** Milwaukee, Wis. $1,528,113. Engine generator sets and overpack sets. Harvey, Ill. Engineer Research and Development Laboratory, Fort Belvoir, Va.

—**Kaiser Aluminum & Chemical Sales, Inc.,** Oakland, Calif. $21,372,000. Manufacture of aluminum honeycomb core sandwich-type airplane landing mat material. Engineer Waterways Experiment Station, Vicksburg, Miss.

—**Dow Chemical Co.,** Midland, Mich. $5,775,000. Manufacture of MX-18 extruded aluminum airplane material. Madison, Ill. Engineer Waterways Experiment Station, Vicksburg, Miss.

—**Hercules, Inc.,** Wilmington, Del. $26,638,755. Miscellaneous propellants. Lawrence, Kan. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**R.C.A.,** Camden, N.J. $3,000,000 Classified repairs parts. Electronics Command, Fort Monmouth, N.J.

—**DeWeese Construction Co.,** Covina, Calif. $1,011,217. Construction of an addition to an existing hospital at Edwards AFB, Calif. Engineer Dist., Los Angeles, Calif.

—**White Motors,** Lansing, Mich. $18,296,767. 2½-ton trucks. General Purpose Vehicles Project Manager, Warren, Mich.

—**Mason & Hanger, Silas Mason Co.,** Lexington, Ky. $4,396,741. Loading, assembling, and packing bombs, and for facilities for manufacture of eight-inch, M106 shells. Grand Island, Neb. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.,** East Alton, Ill. $4,128,411. Miscellaneous propellants. Baraboo, Wis. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.,** New York, N.Y. $4,880,231. Explosives. Joliet, Ill. Amunition Procurement & Supply Agency, Joliet, Ill.

—**Day & Zimmermann, Inc.** $9,623,759. Miscellaneous explosive items. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Southern Airways Co.,** Atlanta, Ga. $1,912,553. Metal parts for 155mm M107 projectiles. Sylacauga, Ala. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Mfg. Co.,** Waterloo, Iowa. $4,470,484. Metal parts for 155mm M107 projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Ravenna Arsenal, Inc.,** Akron, Ohio. $1,410,674. Conversion of 90mm high explosive cartridges to 90mm high explosive antitank cartridges. Ravenna, Ohio.

Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $5,032,315. Miscellaneous propellants, and design and operation of TNT facilities. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $9,364,748. Miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $1,652,264. Various items of ammunition including loading, assembling and packing 105mm, 60mm, and 4.2-inch cartridges. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Holston Defense Corp.**, Kingsport, Tenn. $9,129,266. Production of explosives. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y. $2,421,838. Loading, assembling and packing miscellaneous medium caliber items of ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Mason & Hanger, Silas Mason Co.**, New York, N.Y. $6,908,808. Loading, assembling and packing miscellaneous artillery ammunition and aerial mines. Burlington, Iowa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Remington Arms Co.**, Bridgeport, Conn. $1,987,323. Manufacture of miscellaneous small arms ammunition. Independence, Mo. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $1,475,008. Propellants. Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Sperry Rand Corp.**, New York, N.Y. $1,259,018. Load, assemble and pack ammunition. Shreveport, La. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Applied Devices Corp.**, College Point, N.Y. $1,304,412. Surveying instruments. Mobility Equipment Command, St. Louis, Mo.

—**AVCO Corp.**, Stratford, Conn. $2,084,015. Turbine nozzles for T53 engines. Aviation Materiel Command, St. Louis, Mo.

—**Boyertown Auto Body Works**, Boyertown, Pa. $3,318,958. Six-ton semi-trailers. Tank Automotive Command, Warren, Mich.

—**Hanson Machinery Co.**, Tiffin, Ohio. $4,336,866. Five-ton cranes. Mobility Equipment Command, St. Louis, Mo.

—**Christie Electric Corp.**, Los Angeles, Calif. $1,068,454. A transformer to provide power for various portable radios while in a stationary situation where commercial or AC power is available. Electronics Command, Fort Monmouth, N.J.

—**Philco-Ford Corp.**, Philadelphia, Pa. $3,000,000. Maintenance and operation services in connection with the Integrated Wide Band Communications System in Thailand. Electronics Command, Fort Monmouth, N.J.

—**Page Communications Engineers**, Washington, D.C. $3,950,000. Maintenance and operation services in connection with the Integrated Wide Band Communications Systems in South Vietnam. Electronics Command, Fort Monmouth, N.J.

—**Rand Corp.**, Santa Monica, Calif. $1,717,850. A classified study. Defense Supply Service, Washington, D.C.

NAVY

1—**Boeing Co.**, Morton, Pa. $30,511,640. CH-46D helicopters. Naval Air Systems Command.

—**Lockheed Aircraft**, Burbank, Calif. $10,662,636. SP-2H aircraft. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $4,000,000. Phase II development of TF-30-P-12 engines. Naval Air Systems Command.

—**Pacific Coast Engineering Co.**, Alameda, Calif. $3,705,550. Construction of six cargo craft. Naval Ship Systems Command.

—**Marinette Marine Corp.**, Marinette, Wis. $3,450,625. Construction of five harbor tug boats. Naval Ship Systems Command.

—**Martin Marietta**, Baltimore, Md. $1,881,086. Classified work on Navy aircraft. Naval Air Systems Command.

—**Electric Storage Battery Co.**, Philadelphia, Pa., $1,341,937. Submarine storage battery elements and cells. Naval Ship Systems Command.

—**Pacific Coast Engineering Co.**, Alameda, Calif. $1,096,000. Construction of an aluminum landing craft, utility (LCU). Naval Ship Systems Command.

2—**Lockheed Aircraft**, Burbank, Calif. $11,190,543. Support of FY 1967 procurement of P-3B aircraft. Naval Air Systems Command.

—**General Dynamics**, Pomona, Calif. $3,500,000. Production of medium range Standard missiles. Naval Ordnance Systems Command.

—**Maxson Electronic Corp.**, Macon, Ga. $1,116,318. Detonating fuses for 8-inch, 55-caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Sanders Associates, Inc.**, Nashua, N.H. $1,170,656. Sonobuoys. Naval Air Systems Command.

5—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $2,700,000. FY 68 procurement of A-6A aircraft. Naval Air Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $2,656,000. Production of A-7D aircraft. Naval Air Systems Command.

—**Corbetta Construction Co.**, Des Plaines, Ill. $2,173,000. Construction of staff barracks and Wave barracks at the Great Lakes Naval Training Center. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Hickok Electrical Instrument Co.**, Cleveland, Ohio. $1,780,816. Oscilloscopes. Naval Ship Systems Command.

—**John C. Long, Inc.**, Chicago, Ill. $1,702,405. Construction of a technical training building at the Great Lakes Naval Training Center. Midwest Div., Naval Facilities Engineering Command, Great Lakes, Ill.

—**Todd Shipyards**, San Pedro, Calif. $1,520,000. Regular overhaul of the oiler USS Caliente (AO-53). Supervisor of Shipbuilding, Eleventh Naval Dist., San Diego, Calif.

—**Honeywell, Inc.**, Seattle, Wash. $1,300,000. Ceramic transducers for the Mark 37 torpedo improvement plan. Naval Ordnance Station, Forest Park, Ill.

—**Akwa-Downey Construction Co.**, Milwaukee, Wis. $1,375,000. Construction of headquarters and maintenance facilities at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Coneen Construction Corp.**, El Cajon, Calif. $1,227,000. Construction of personnel support facilities in the Horno Area, Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Horne Bros., Inc.**, Newport News, Va. $1,192,258. Regular overhaul of the transport USS Fremont (APA 44). Supervisor of Shipbuilding, Fifth Naval Dist., Norfolk, Va.

6—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $10,400,000. Research and development on EA-6B aircraft. Naval Air Systems Command.

—**Garrett Corp.**, Phoenix, Ariz. $1,199,086. Air turbine starters and spare components. Naval Air Systems Command.

7—**Eastman Kodak Co.**, Rochester, N.Y. $5,157,994. Fuzes for ammunition. Navy Ships Part Control Center, Mechanicsburg, Pa.

—**Dickman Construction Co.**, Mountain View, Calif. $4,212,000. Construction of 260 family housing units at the Naval Air Station, Moffett Field, Calif. Naval Facilities Engineering Command.

—**Union Carbide, Corp.**, New York, N.Y. $2,157,878. Components for ammunition for three-inch and five-inch guns. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Kilgore Corp.**, Toone, Tenn. $1,107,392. Aircraft float lights. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Sperry Rand Corp.**, Syosset, N. Y. $1,690,000. Electronic test equipment for use in testing equipment and subsystems of ship inertial navigation systems. Naval Ship Systems Command.

—**Litton Systems**, Woodland Hills, Calif. $1,547,900. Spare parts for use on A-6A aircraft. Aviation Supply Office, Philadelphia, Pa.

—**United Aircraft**. $1,436,780. Propellor systems for P-3B aircraft. Aviation Supply Office, Philadelphia, Pa.

—**Alliance Webbing, Inc.**, New York, N.Y. $1,375,848. Tape assemblies used in arresting gear aboard aircraft carriers. Central Falls, R. I. Naval Air Engineering Center, Philadelphia, Pa.

8—**Kaman Aircraft**, Bloomfield, Conn. $2,908,296. Additional funding for conversion of UH-2A/B helicopters to twin engine configuration designated UH-2C. Naval Air Systems Command.

—**R.C.A.**, Moorestown, N. J. $2,042,700. Radar pulse doppler modification spare parts. Naval Air Systems Command.

—**Sippican Corp.**, Marion, Mass. $1,986,991. Expendable bathythermographs, recorders and launchers for use in oceanographic survey projects. Naval Ship Systems Command.

—**Texas Instruments**, Dallas, Tex. $1,978,528. Guidance and control sections and wing and fin sets for Shrike missiles. Naval Air Systems Command.

—**Westinghouse Electric**, Baltimore, Md. $1,000,000. Production of prototype models of special exercise sections of MK 48 torpedoes. Naval Ordnance Systems Command.

—**Magnavox Corp.**, Fort Wayne, Ind. $1,163,687. Sonobuoys. Naval Air Systems Command.

9—**United Aircraft**, Hartford, Conn. $15,782,481. J52–P8A engines. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $6,885,447. Modification kits for airborne radar sets. Naval Air Systems Command.

—**Collins Radio Co.**, Richardson, Tex. $6,773,723. Airborne communications systems and related equipment. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $4,288,800. MQM–74A target drones. Naval Air Systems Command.

—**Sanders Associates**, Nashua, N.H. $4,218,097. Electronic equipment. Naval Air Systems Command.

—**Garrett Corp.**, Los Angeles, Calif. $2,334,737. Compression power units and related equipment. Naval Air Systems Command.

—**Douglas Aircraft**, Long Beach, Calif. $1,850,158. Bomb racks and adapter kit sets. Torrance, Calif. Naval Air Systems Command.

—**Sylvania Electric Products**, Waltham, Mass. $1,540,000. Airborne receiver-transmitter radio sets. Naval Air Systems Command.

—**Garrett Corp.**, Phoenix, Ariz. $1,376,815. P–3A and P–3B aircraft. Naval Air Systems Command.

—**Garrett Corp.**, Phoenix, Ariz. $1,056,939. T76–G10 engines. Naval Air Systems Command.

—**EDO Corp.**, College Point, N.Y. $1,988,253. Retrofit kits for installation on sonar equipment aboard naval ships. Naval Ship Systems Command.

—**Pioneer Aerodynamics Systems**, Manchester, Conn. $1,078,000. Parachute and container assemblies for MK 24 parachute flares. Columbia, Miss. Naval Ammunition Depot, Crane, Ind.

—**M. Steinthal and Co.**, New York, N.Y. $1,081,920. Parachute and container assemblies for M24 parachute flares. Roxboro, N.C. Navy Ammunition Depot, Crane, Ind.

—**Columbus Milpar & Mfg. Co.**, Columbus, Ohio. $6,474,774. Fin assemblies for 500-lb. bombs. Columbus. Navy Ships Parts Control Center, Mechanicsburg, Pa.

12—**McDonnell Co.**, St. Louis, Mo. $56,000,000. F–4E aircraft. Naval Air Systems Command.

—**Centex Construction Co.**, Dallas, Tex. $4,927,357. 350 family housing units at the Naval Air Station, Corpus Christi, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La.

—**Philco-Ford Corp.**, Palo Alto, Calif. $4,999,000. Marine tactical data system equipment, associated support items and technical data. Naval Ship Systems Command.

—**Raytheon Co.**, Sudbury, Mass. $2,396,551. Alteration kits for guidance system electronics assemblies for Polaris missiles. Waltham, Mass. Special Projects Office.

—**U. S. Steel Corp.**, Pittsburgh, Pa. $1,548,462. Bomb bodies for 250-lb. bombs. McKeesport, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Arthus D. Little, Inc.**, Cambridge, Mass. $1,430,347. Various technical studies and analysis for the Sonar Systems Office. Naval Ship Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,175,160. Design review, development, fabrication and test of preproduction models of an electronic countermeasure system. Naval Air System Command.

—**Otis Elevator Co.**, Stamford, Conn. $1,016,532. Analyzer indicators for shipboard installation, engineering services, option for repair parts, and associated technical data. Naval Ship Systems Command.

13—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $15,234,000. TC–4C aircraft. Naval Air Systems Command.

—**General Precision, Inc.**, Glendale, Calif. $3,500,000. Modification kits for fire control systems for MK 48 torpedoes. Naval Ordnance Systems Command.

—**ITT Gilfillan, Inc.**, Los Angeles, Calif. $1,693,069. Radar sets, transmitters, indicator units and related accessories. Naval Ship Systems Command.

—**Houdaille Duval Wright** Co., Jacksonville, Fla. $1,073,200. Construction of an aircraft parking apron and taxiway at the Naval Air Station, Jacksonville, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

14—**Teledyne Systems**, Hawthorne, Calif. $14,434,185. Self-contained navigation systems. Naval Air Systems Command.

—**North American Aviation.** $10,921,286. Conversion of A–5A aircraft to RA–5C configuration. Naval Air Systems Command.

—**PRD Electronics**, Westbury, N.Y. $5,925,000. Versatile avionics shop test systems and support equipment. Naval Air Systems Command.

—**Ling-Temco-Vought, Inc.**, Greenville, Tex. $1,747,280. Modification of EC–121K aircraft. Naval Air Systems Command.

—**United Aircraft**, Stratford, Conn. $1,300,000. S–61R helicopters for the Air Force. Naval Air Systems Command.

—**Sundstrand Corp.**, Rockford, Ill. $1,351,180. Constant speed drive kits for A–7A aircraft. Naval Air Systems Command.

—**Sanders Associates**, Nashua, N.H. $1,753,274. Electronic equipment. Naval Air Systems Command.

—**Honeywell, Inc.**, Hopkins, Minn. $2,622,944. Ignition assemblies for ASROC. Saugus, Calif. Naval Ordnance Systems Command.

—**Poloron Products**, New Rochelle, N.Y. $2,590,595. Bomb fin assemblies for MK 82 bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Metals Engineering Corp.**, Greeneville, Tenn. $1,892,814. Bomb fin assemblies. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**West Bend Co.**, West Bend, Wis. $1,274,100. Cartridge tanks for storing ammunition. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Treadwell Corp.**, New York, N.Y. $1,008,469. Repair of Government furnished oxygen generators and procurement of long lead time equipment in connection with repair effort. Naval Ship Systems Command.

—**Smith & Sapp Construction Co.**, Orlando, Fla. $1,579,443. Construction of a 4,600-man mess hall at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Chaleston, S.C.

15—**Stromberg Carlson Corp.**, San Diego, Calif. $2,164,800. Airborne tactical data display systems for ASW aircraft. Naval Air Systems Command.

—**Lear Siegler, Inc.**, Grand Rapids, Mich. $2,100,236. Loft bomb computer system components. Naval Air Systems Command.

—**Northeast Construction Co.**, Parkersburg, W. Va. $1,277,150. Construction of support facilities at the Naval Radio Station, Sugar Grove, W. Va. Chesapeake Div., Naval Facilities Engineering Command, Washington, D.C.

16—**Lear Siegler, Inc.**, Grand Rapids, Mich. $5,998,200. Airborne attitude heading reference systems. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $2,669,121. Spare parts for A–7B aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**D. K. Chavis, Inc.**, Pensacola, Fla. $2,056,500. Construction of bachelor officers' quarters at the Naval Air Station, Pensacola, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S. C.

—**Alliance Webbing, Inc.**, New York, N.Y. $1,376,000. 11-inch nylon tape used in the arrestment of aircraft aboard aircraft carriers. Central Falls, R.I. Naval Air Engineering Center, Philadelphia, Pa.

—**Sparton Corp.**, Jackson, Mich. $1,868,000. Bathythermograph transmitter sets. Naval Air Systems Command.

—**EPSCO, Inc.**, Westwood, Mass. $1,482,922. Signal generators and related data used to check-out electronics equipment. Naval Ship Systems Command.

—**Westinghouse Electric**, Washington, D.C. $1,200,000. Rotors for service turbine generator sets aboard submarines. Sunnyvale, Calif. Naval Ship Systems Command.

19—**LTV Aerospace Corp.**, Dallas, Tex. $17,070,017. Services and materials for improvements to extend service life of F–8D aircraft. Naval Air Systems Command.

—**Alsco, Inc.**, St. Louis, Mo. $8,421,186. Rocket launchers. Naval Air Systems Command.

—**Johns Hopkins University**, Silver Spring, Md. $5,678,905. Research and development on the Bumblebee project. Naval Ordnance Systems Command.

20—**Westinghouse Electric**, Baltimore, Md. $70,552,520. Airborne radar sets. Naval Air Systems Command.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. A–6A aircraft. Naval Air Systems Command.

—**General Time Corp.**, Stamford, Conn. $8,926,805. Fuzes for 5-inch projectiles. Peru, Ill. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**United Aircraft**, East Hartford, Conn. $2,471,093. Spare parts for A–7B aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**Melpar, Inc.**, Falls Church, Va. $2,292,010. Airborne radar homing and warning sets. Naval Air Systems Command.

—**Kaman Aircraft**, Bloomfield, Conn. $1,600,000. Main rotor blades for UH–2A, B, and C helicopters. Navy Aviation Supply Office, Philadelphia, Pa.

—**Sanders Associates, Inc.**, Nashua, N.H. $1,260,000. Continued basic engineering and development of an air droppable ASW sonobuoy system. Naval Air Systems Command.

—**Vitro Corp. of America**, Silver Spring, Md. $1,216,308. Engineering and supporting services for Terrier, Tartar and Talos missiles. Naval Ordnance Systems Command.

21—**Honeywell, Inc.**, North Hopkins, Minn. $22,655,644. Production of Mark 46 torpedoes. Naval Ordnance Systems Command.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $6,689,481. Spare parts to support several types of aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**Universal Aircraft Services, Inc.**, Inkster, Mich. $3,339,200. Terminal and ground support services for Quicktrans air carrier operations. Navy Purchasing Office, Washington, D.C.

—**Chesapeake Instrument Corp.**, Shadyside, Md. $2,430,025. Classified supplies and services for sonar equipment aboard nuclear powered fleet ballistic missile submarines. Navy Ship Systems Command.

—**Willamette Iron & Steel Co.**, Portland, Ore. $2,282,858. Activation and overhaul of the fleet minesweepers USS Speed and USS Dextrous. Supervisor of Shipbuilding, 13th Naval Dist., Seattle, Wash.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,223,456. 15-man lifeboats. Magnolia, Ark. Navy Ships Parts Control Center, Mechanicsburg, Pa.

22—**United Aircraft**, Stratford, Conn. $5,971,200. SH–3D helicopters. Naval Air Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $10,143,843. A–7D aircraft. Naval Air Systems Command.

—**PRD Electronics**, Westbury, N.Y. $4,740,000. Versatile Avionics Shop Test systems and associated equipment. Naval Air Systems Command.

—**General Electric**, Utica, N.Y. $2,995,647. Airborne data processing systems. Naval Air Systems Command.

—**AVCO Corp.**, Stratford, Conn. $2,536,400. Constant speed drives for Navy aircraft. Naval Air Systems Command.

—**Grumman Aircraft Engineer Corp.**, Bethpage, N.Y. $1,935,000. Retrofit of government-owned milling machines. Naval Air Systems Command.

—**General Precision**, Clifton, N.J. $1,753,564. Airborne navigational computer sets. Naval Air Systems Command.

—**General Electric**, Binghampton, N.Y. $1,527,581. Automatic flight control systems and related equipment. Naval Air Systems Command.

—**Sparton Corp.**, Jackson, Mich. $1,494,400. Bathythermograph transmitter sets. Naval Air Systems Command.

—**McDonnell Douglas Corp.**, Long Beach, Calif. $1,080,297. Ducts and connection assemblies for A–3 aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**EFMC Corp.**, Los Angeles, Calif. $1,278,366. Weather shields for 5-inch/54 caliber gun mounts. Naval Ordnance Station, Louisville, Ky.

23—**Raytheon Co.**, Portsmouth, R.I. $29,627,090. Submarine sonar sets. Naval Ship Systems Command.

—**Akwa Downey Construction Co.**, Milwaukee, Wis. $5,327,042. Construction of recruit barracks at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Sperry Piedmont Co.**, Charlottesville, Va. $4,209,544. Radar equipment for naval ships. Naval Ship Systems Command.

—**General Dynamics**, San Diego, Calif. $2,760,000. Tracking radar systems. Naval Air Systems Command.

—**Northrop Corp.**, Norwood, Mass. $2,052,572. Manufacture and repair of inertial reference integrating gyroscopes. Special Projects Office.

—**Martin-Marietta**, Orlando, Fla. $1,772,394. Radio test sets, frequency comparators and command link test sets. Aviation Supply Office, Philadelphia, Pa.

—**Jarbet Co.**, San Antonio, Tex. $1,426,500. Improvements to runways and taxiways at the Naval Auxiliary Air Station, Beeville, Tex. Gulf Div., Naval Facilities Engineering Command, New Orleans, La.

—**Hydromatics, Inc.**, Bloomfield, N.J. $1,013,965. Ball valves used on nuclear submarines. Naval Supply Center, Oakland, Calif.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $12,202,209. High-capacity, amphibious assault fuel systems. Magnolia, Ark.; Buffalo, N.Y.; Mansfield and Akron, Ohio. Marine Corps., Headquarters.

26—**International Harvester**, San Diego, Calif. $2,070,334. Auxiliary power plants for Navy helicopters. Naval Air Systems Command.

—**Dubie-Clark Co.**, Toccoa, Ga. $4,115,232. Shipping and storage containers for Walleye missiles. Naval Air Systems Command.

—**McDonnell-Douglas Corp.**, St. Louis, Mo. $2,813,146. Structural fatigue testing of Navy aircraft. Naval Air Systems Command.

—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $14,000,000. Research and development on EA6B aircraft. Naval Air Systems Command.

—**Sylvania Electronics Systems**, Needham Heights, Mass. $1,783,923. A Research tool digital computer system. Naval Training Device Center, Orlando, Fla.

—**General Precision**, Binghampton, N.Y. $2,266,791. F–4D (IR) weapon system training set and support items. Palo Alto, Calif. Naval Training Device Center, Orlando, Fla.

—**General Dynamics**, Groton, Conn. $2,968,617. Preparatory work for regular overhaul and refueling of the nuclear powered ballistic missile submarine USS Nathan Hale (SSBN–623). Naval Ship Systems Command.

—**General Electric**, Schenectady, N.Y. $1,506,840. Nuclear propulsion components. Naval Ship Systems Command.

—**Food Machinery Corp.**, San Jose, Calif. $3,176,866. Design and development of a prototype Mark I deep dive system for deep-sea rescue and salvage operations. Navy Purchasing Office, Los Angeles, Calif.

—**S. J. Amoroso Construction Co.**, San Francisco, Calif. $1,019,860. Construction of an ammunition transfer facility at the Naval Weapons Station, Concord, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif.

—**D. K. Chavis, Inc.**, Pensacola, Fla. $1,672,500. Construction of an aircraft maintenance hanger at the Naval Air Station, Pensacola, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S. C.

27—**Hazeltine Corp.**, Little Neck, N.Y. $1,424,986. Acoustic detection transmitting sets. Naval Air Systems Command.

—**Hughes Tool Co.**, Culver City, Calif. $3,800,242. 20mm gun pods and related equipment. Naval Air Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $1,604,000. Long lead time effort and materials to support proposed changes which will extend the service life of RF–8A aircraft. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,960,000.

Detection transmitting sets. Naval Air Systems Command.

—**General Electric**, Santa Barbara, Calif. $1,200,000. Research of Fleet Anti-Submarine Warfare data analyses. Office of Naval Research, Washington, D.C.

—**G. L. Cory, Inc.**, San Diego, Calif. $3,971,368. Construction of a technical training building at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

28—**Falcon Carriers, Inc.**, New York, N.Y. and **Charles Kurz & Co.**, Philadelphia, Pa. $57,500,000 and $16,000,000 (respectively). Charter of five newly built tankers over a five year period beginning Dec. 31, 1969. Military Sea Transportation Service.

—**Bell Aerosystems Co.**, Buffalo, N.Y. $5,558,770. Major equipment for the automatic carrier landing system. Wheatfield, N.Y. Naval Ship Systems Command.

—**Polarad Electronics Corp.**, Long Island City, N.Y. $1,297,764. Radio frequency amplifier equipment and spare parts. Naval Ship Systems Command.

—**Electronics Communications, Inc.**, St. Petersburg, Fla. $3,261,643. Communications equipment for the Marine Tactical Data System and in other field applications. Naval Ship Systems Command.

—**General Electric**, Syracuse, N.Y. $4,846,065. Mine detecting/classifying sonar sets. Naval Ship Systems Command.

—**General Electric**, Schenectady, N.Y. $5,047,628. Nuclear propulsion components. Naval Air Systems Command.

—**Westinghouse Electric**, Washington, D.C. $10,323,201. Production of main assembly and related equipment for the MK 45 Mod 1 torpedo. Baltimore, Md. Naval Ordnance Systems Command.

—**ITT Federal Laboratories**, Nutley, N.J. $1,214,985. Electronic countermeasure equipment. Naval Air Systems Command.

—**Texas Instruments, Inc.**, Dallas, Tex. $1,049,384. Shrike missile guidance and control sections and sets of wings and fins. Naval Air Systems Command.

—**E. W. Bliss Co.**, South Portland, Maine. $3,156,749. M21 arresting gear systems and spares used for shore base arresting of aircraft. Naval Air Engineering Center, Philadelphia, Pa.

—**International Builders of Florida, Inc.**, Coral Gables, Fla. $2,989,000. Construction of two 900-man barracks at the Marine Corps Recruit Depot, Parris Island, S.C. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

29—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $13,583,919. Tactical field services support for the Polaris missile program. Special Projects Office.

—**M.I.T.**, Cambridge, Mass. $2,950,000. Additional multi-access computer study. Office of Naval Research.

—**H. W. Stanfield Construction Corp.**, and **S. L. Haehn, Inc.**, San Diego, Calif. $2,889,900. Construction of barracks at the Marine Corps Recruit Depot, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Woods Hole Oceanographic Institution**, Woods Hole, Mass. $2,476,509. Oceanographic studies. Office of Naval Research.

—**Hercules, Inc.**, Wilmington, Del. $1,314,931. Nitrocellulose, a chemical used in propellant manufacture. Parlin, N.J. Naval Ordnance Station, Indian Head, Md.

—**General Electric**, Utica, N.Y. $1,160,000. Spare parts for E–2A aircraft radar sets. Navy Aviation Supply Office, Philadelphia, Pa.

—**Raber-Kief, Inc.**, and **B-E-C-K Constructors**, Seattle, Wash. $1,096,000. Additions to power Plant #3, Naval Station, Adak, Alaska. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash.

—**Astro-Science Corp.**, South El Monte, Calif. $1,874,017. Acquisition of wind tunnel aerodynamic data on propeller performance. Naval Air Systems Command.

—**Raytheon Co.**, Lexington, Mass. $4,500,000. Sparrow III guided missiles. Lowell, Mass. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $5,560,000. Continued development of the TF–30–P–13 engine. Naval Air Systems Command.

—**McDonnell Douglas Corp.**, St. Louis, Mo. $72,374,000. F–4J and F–4E aircraft. Naval Air Systems Command.

—**Alsco, Inc.**, St. Louis, Mo. $6,736,949. Rocket launchers. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,000,000. Modification kits for airborne radar sets. Naval Air Systems Command.

—**Yankee Walter Corp.**, Los Angeles, Calif. $1,013,207. Aircraft crash fire and rescue trucks. Naval Air Systems Command.

—**Magnavox Co.**, Fort Wayne, Ind. $1,568,000. Detection transmitting sets. Naval Air Systems Command.

—**ITT Federal Laboratories**, San Fernando, Calif. $1,739,165. Radio navigation sets with ancillary items and services. Naval Ship Systems Command.

—**R.C.A.**, Camden, N.J. $1,065,000. Radio sets, test equipment and associated technical data. Naval Ship Systems Command.

—**Sylvania Electronics Systems**, Williamsville, N.Y. $2,042,325. Classified communications equipment. Naval Ship Systems Command.

—**Edo Corp.**, College Point, N.Y. $3,441,637. Long range detection and tracking sonar equipment. Naval Ship Systems Command.

—**Loadcraft, Inc.**, Denton, Tex. $1,605,728. Air transportable vans with air conditioners for use in avionics maintenance facilities. Brady, Tex. and Bay Shore, N.Y. Headquarters, Marine Corps.

30—**General Electric**, Syracuse, N.Y. $5,763,532. Advanced developmental sonar sets for submarines. Naval Ship Systems Command.

—**ITT Gilfillan, Inc.**, Los Angeles, Calif. $2,566,300. Modification kits for radar equipment used aboard ships. Naval Ship Systems Command.

—**R.C.A.**, Camden, N.J. $2,130,000. Radio sets, modules and spare parts, and data items. Naval Ship Systems Command.

—**Sperry Rand Corp.**, Charlottesville, Va. $1,648,290. Vehicle gyrocompasses. Naval Ship Systems Command.

—**Hughes Aircraft**. $1,545,388. Modification kits for radar equipment. Naval Ship Systems Command.

—**ITT Federal Laboratories**, Nutley, N.J. $1,126,000. Radio sets, repair parts and sundry data items for Marine Corps use. Naval Ship Systems Command.

—**FMC Corp.**, San Jose, Calif. $1,250,000. Design, development and construction of two assault amphibian recovery vehicles and conversion of one LVTPX12 amphibian to a prototype assault command vehicle. Naval Ship Systems Command.

—**Speciality Electronics Development Corp.**, Glendale, N.Y. $1,015,000. Radar switchboard equipment. Naval Ship Systems Command.

—**Teledyne Corp.**, Berwick, La. $1,101,245. Eight 50-foot, twin-screw aluminum patrol launches and spare parts. Naval Ship Systems Command.

—**LTV Aerospace Corp.**, Dallas, Tex. $62,628,000. A–7B aircraft. Naval Air Systems Command.

—**North American Aviation**, McGregor, Tex. $10,509,974. Sparrow and Shrike missile rocket motors. Naval Air Systems Command.

—**McDonnell-Douglas Corp.**, St. Louis, Mo. $3,066,674. Bomb racks and adapter kit sets. Torrance, Calif. Naval Air Systems Command.

—**Sperry Rand Corp.**, St. Paul, Minn. $2,200,000. Avionics computers. Naval Air Systems Command.

—**Kaman Aircraft**, Bloomfield, Conn. $1,407,203. Conversion of UH–2A/B helicopters to a twin engine configuration designated UH–2C. Naval Air Systems Command.

—**Cessna Aircraft**, Wichita, Kan. $1,037,400. Ejector pylon assemblies. Naval Air Systems Command.

—**Symetrics Engineering Corp.**, Satellite Beach, Fla. $2,675,000. Fabricate, install and test telemetry antenna systems. Navy Purchasing Office, Los Angeles, Calif.

—**Hughes Aircraft**, Fullerton, Calif. $2,148,682. Design and fabrication of multi-mode sonar consoles and passive data memory units. Navy Purchasing Office, Los Angeles, Calif.

—**Monitor Systems, Inc.**, Fort Washington, Pa. $1,614,915. Telemetry separations and display systems for use at the Pacific Missile Range, Point Mugu, Calif. Navy Purchasing Office, Los Angeles, Calif.

—**FMC Corp.**, Minneapolis, Minn. $14,773,064. 5-inch/54 mod 9 gun mounts. Naval Ordnance Station, Louisville, Ky.

—**Admiral Corp.**, Chicago, Ill. $5,547,995. AN/ARC–51 radio sets for use on various aircraft. Navy Aviation Supply Office, Philadelphia, Pa.

—**General Electric**, Washington, D.C. $4,630,000. Design and development of the Poseidon fire control and support equipment. Pittsfield, Mass. Special Projects Office.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $2,491,833. Mark 41, 5-inch, 54 caliber projectiles. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**John Hopkins University**, Silver Spring, Md. $2,005,000. Talos missile research and development. Naval Ordnance Systems Command.

—**Otis Elevator Co.**, Stamford, Conn. $1,967,182. 152mm gun launcher trainers. Naval Training Device Center, Orlando, Fla.

—**A C Electronics**, Goleta, Calif. $1,060,120. Production of synchronous clocks for the MK 46 and MK 48 torpedoes and associated programs, and related electronics. Naval Ordnance Systems Command.

AIR FORCE

1—**Bendix Corp.**, Teterboro, N.J. $1,963,762. Aircraft electronic equipment and aerospace ground equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Carnegie Institute of Technology**, Pittsburgh, Pa. $1,717,000. Research in electronic information data processing equipment. Air Force Office of Scientific Research, Washington, D.C.

—**General Electric**, West Lynn, Mass. $2,287,920. 1967 component improvement engineering program for J–85 engines. Aeronautical Systems Div., (AFSC), Wright-Paterson AFB, Ohio.

2—**I.B.M.**, Owego, N.Y. $1,564,942. Repair and modification of components of the bombing navigation system for B–52 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Tridea Electronic**, Pasadena, Calif. $1,170,930. Electronic instruments. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $5,246,250. Aircraft engine starter cartridges. Marion, Ill. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Magnavox Co.**, Fort Wayne, Ind. $1,957,596. Production of airborne communications equipment. Fort Wayne. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

5—**Maxson Electronics Corp.**, Macon, Ga. $4,293,534. Bomb fuze components. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—**Martin Marietta**, Baltimore, Md. $3,248,490. Integration and installation of Government furnished equipment to convert KC–135 aircraft to RC–135 configuration. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

8—**Edgerton, Germeshausen and Grier, Inc.**, Bedford, Mass. $3,465,534. Production of weather plotting communication equipment. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

9—**Applied Technology, Inc.**, Sunnyvale, Calif. $1,037,500. Production of spare parts for radar equipment for B–52 aircraft. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Oakland Construction Co.**, Salt Lake City, Utah. $1,793,000. Construction of a Minuteman engineering test facility at Hill, AFB, Utah. Army Engineer, Sacramento, Calif.

13—**Ling Temco Vought Aerospace Corp.**, Dallas, Tex. $1,500,000. Space vehicles. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Hazeltine Corp.**, Little Neck, N.Y. $5,422,383. Integrating the MK XII re-entry vehicle with the ballistic missile systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Bendix Corp.**, Davenport, Iowa. $1,410,717. Production of airborne computer components. Denver, Colo. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Electric**, Cincinnati, Ohio. $5,714,515. Production of J–79–17 aircraft engines. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

15—**United Aircraft**, East Hartford, Conn. $1,500,000. Work on advanced aircraft propulsion systems. Aeronautical Systems

Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Kaman Aircraft**, Bloomfield, Conn. $1,710,961. Production of HH-43 helicopters and related equipment. Bloomfield. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Radiation Service Co.**, Melbourne, Fla. $2,255,000. Support services on the ballistic missile re-entry data processing system. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

—**Aircraft Armaments**, Cockeysville, Md. $2,115,414. Production of electronic countermeasures training equipment. Aernautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Kollsman Instrument Corp.**, Elmhurst, N.Y. $1,330,295. Production of computer test equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Electric**, Cincinnati, Ohio. $1,500,000. Work on advanced aircraft propulsion systems. Evandale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**International Telephone & Telegraph Corp.**, Nutley, N.J. $5,642,300. Production of airborne LORAN navigational sets and related equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Martin-Marietta**, Orlando, Fla. $2,500,000. Production of space vehicle guidance system components. Aernautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Cessna Aircraft**, Wichita, Kan. $1,150,000. Production of T-37 trainer aircraft. Wichita. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

16—**Applied Technology, Inc.**, Palo Alto, Calif. $1,475,230. Production of electronic equipment and for F-100 aircraft. Sunnyvale and Palo Alto, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Continental Electronic Mfg. Co.**, Dallas, Tex. $2,000,000. Development on ballistic re-entry systems. Rome Air Development Center, (AFSC), Griffiss AFB, N.Y.

—**AVCO Corp.**, Cincinnati, Ohio. $2,308,936. Defense radar display systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**International Telephone & Telegraph Corp.**, Fort Wayne, Ind. $2,978,000. Production of a Strategic Air Command operational planning system. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**AVCO Corp.**, New York, N.Y. $1,495,000. Design, development and production of a penetration aids system. Stratford, Conn. and Wilmington, Mass. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

19—**Martin-Marietta**, Orlando, Fla. $2,000,000. Production of components for Bullpup air-to-ground missiles. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—**Wilcox Electric Co.**, Kansas City, Mo. $2,605,962. Production of VHF communication equipment. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Elder-Oilfield, Inc.**, Houston, Tex. $4,066,971. Production of prefabricated medical facilities. Vicksburg, Miss. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

22—**Sanders Associates**, Bedford, Mass. $2,999,000. Production of fuzes for aircraft ordnance. Aernautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Brooks & Perkins**, Detroit, Mich. $2,532,378. Production of air cargo loading pallets. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Litton Systems**, Woodland Hills, Calif. $8,136,340. Production of components for the avionics system of F-4 aircraft. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

23—**Aerojet General**, Sacramento, Calif. $6,200,000. Components for the TITAN 111M rocket system. Space Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Motors**, Indianapolis, Ind. $5,997,331. T-56 engine component improvement program. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

26—**Aerojet General**, Azusa, Calif. $1,545,000. Advanced aerial reconnaissance studies. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Precision**, Binghampton, N.Y. $1,241,865. Production of instrument flight trainers. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Lockheed Aircraft**, Marietta, Ga. $5,008,844. Production of C-141 engine build-up kits. Chula Vista, Calif. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Boeing Co.**, Wichita, Kan. $1,158,596. Modification and maintenance of B-52 aircraft. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

27—**Lenkurt Electric Co.**, San Carlos, Calif. $2,004,500. Production of tranportable radio communication systems. Oklahoma City City Air Materiel Area, (AFLC), Tinker AFB, Okla.

28—**Goodyear Aerospace Corp.**, Litchfield Park, Ariz. $1,600,000. Research on high resolution radar. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Pan American World Airways**, New York, N.Y. $35,000,000. Management, operation and maintenance services for the Eastern Test Range, Fla. Air Force Eastern Test Range, Patrick AFB, Fla.

—**General Electric**, Philadelphia, Pa. $1,600,000. Research and development on ballistic re-entry vehicles. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**ARO, Inc.**, Arnold Air Force Station, Tenn. $48,300,000. Management, operation and maintenance services at Arnold Engineering and Development Center for FY 1968. Arnold Engineering & Development Center, Arnold AFS, Tenn.

29—**Batesville Mfg. Co.**, Batesville, Ark. $1,708,741. Production of bomb components. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**General Electric**, Burlington, Vt. $1,326,675. Procurement of spare parts for aircraft armament. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Martin Marietta**, Denver, Colo. $7,982,322. Procurement of Titan IIIX space boosters and associated equipment. Space Systems Div., (AFSC), Los Angeles, Calif.

30—**Texas Instruments**, Dallas, Tex. $3,378,512. Design, development and production of a tactical information processing sub-system. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Hughes Aircraft**, Culver City, Calif. $3,110,000. Research work on advanced reconnaissance systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Hallicrafters Co.**, Chicago, Ill. $1,500,000. Production of components for electronic countermeasure systems. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Wilcox Electric Co.**, Kansas City, Mo. $1,460,547. Production of VHF airborne radio sets. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Lockheed Aircraft Corp.**, Ontario, Calif. $7,000,000. FY 1968 maintenance services in support of the F-104 transition pilot training program. Luke AFB, Ariz. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**North Electric Co.**, Galion, Ohio. $4,538,096. Design, production and testing of tactical communication systems. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**Lockheed Aircraft Service Co.**, Jamaica, N.Y. $4,883,410. Annual maintenance service for Special Air Mission Aircraft for FY 1968. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**FWD Corp.**, Clintonville, Wis. $1,503,228. Production of fire fighting trucks. Warner Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

—**Continental Electronics Mfg. Co.**, Dallas, Tex. $1,412,613. FY 1968 operation and maintenance of the Ram and Stallion Radar sites. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

—**General Dynamics**, Fort Worth, Tex. $1,290,950. Operation and maintenance of the Air Force Radar Target Scatter Site for FY 1968. Holloman AFB, N.M. Air Force Missile Development Center, Holloman AFB, N.M.

Progress in SAIMS

(continued from page 14)

but not yet completed. In order to prevent distortions within the contractor's control system, such "in-process" effort must be evaluated on a continuing basis through the use of objective indicators or reasonable and consistent estimation techniques, such as equivalent unit costing in manufacturing areas.

Work Packages. A delineation of the work required to complete a specific job, with objective indicators defining start and completion dates. It must have a planned cost which is time phased and integrated with master and detailed engineering and manufacturing schedules, representative of the described job, and delineated by cost elements, *i.e.*, labor, material, other direct costs. The overall responsibility for the actual performance of the work content of a Work Package must be limited to a single operating level organization.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 1966– May 1967	July 1965– May 1966
Procurement from All Firms	$34,156,591	$28,422,838
Procurement from Small Business Firms	7,020,250	6,287,421
Percent Small Business	20.6	22.1

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, D. C. 20301

OFFICIAL BUSINESS

POSTAGE AND FEES PAID

UNIVERSITY OF FLORIDA
3 1262 09683 3891

FLARE

New Naval Communications Command Established in Washington, D.C., Area

A new Naval Communications Command, located in the Washington, D.C., area, became operational on July 1, 1967, as a result of a major reorganization of the Office of Naval Communications.

Under the revised organizational structure, Rear Admiral Robert H. Weeks, Assistant Chief of Naval Operations (Communications)/ Director of Naval Communications, has been assigned additional duty as Commander, Naval Communications Command, reporting to the Chief of Naval Operations. He has assumed command of all shore (field) activities with responsibility for their primary support. He is also responsible for providing the Navy-wide communications and cryptologic needs of all ships, air and shore activities.

The new command will be concerned primarily with day-to-day operations of the Navy's world-wide communication and cryptologic facilities, permitting greater emphasis, at the Chief of Naval Operations level, on policy matters and support of DOD and Joint Chiefs of Staff communications programs. At the same time closer integration of facilities under field (command) jurisdiction will improve communications support for the fleet.

Tasks and functions to be performed by the command will include those previously assigned to the following separate activities, which have been disestablished: the Naval Communications System Headquarters, Bailey's Crossroads, Va.; and the Naval Security Group Headquarters and the Naval Radio Frequency Spectrum Activity, both at the U.S. Naval Security Station, Washington, D.C.

The command will also be responsible for the operational support of the Defense Communications System, the National Security Agency, the Electromagnetic Compatibility and Analysis Center and the National Communications System.

The Office of the Assistant Chief of Naval Operations (Communications), located in the Pentagon, will perform such staff functions as validation and approval of requirements, planning, program review, evaluation and appraisal.

Continuous Wave Laser in Operation at Redstone Arsenal

The longest, most powerful continuous wave laser in existence has been put into operation by the Research and Development Directorate of the U.S. Army Missile Command at Redstone Arsenal, Alabama.

The nitrogen-carbon dioxide-helium laser is 178 feet long and generates an output power of 2.3 kilowatts. With slight modifications, however, the laser could generate an output of 4.5 kilowatts. The present system operates with an efficiency of 10 to 14 percent. When the modifications are completed, it is expected to operate with an efficiency of 20–28 percent.

Scaling laws, various discharge configurations, gas mixtures, optical components and spectra of the output radiation and of the discharges are being studied in attempts to determine the optimum operating characteristics, and to produce a better understanding of the mechanisms which make these molecular lasers so efficient.

This research is being conducted by the Missile Command's Physical Sciences Laboratory.

☆U. S. GOVERNMENT PRINTING OFFICE : 1967 300-969/1